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LIGHT • HEAT • POWER • BYE-PRODUCTS

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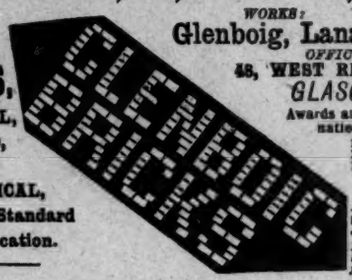

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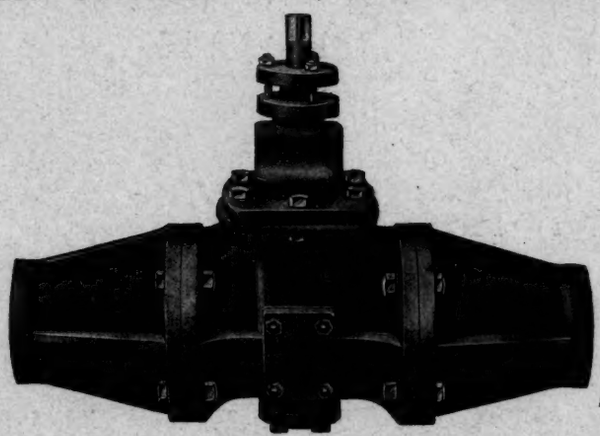

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EDITORIAL NOTES.

Lower Temperature Carbonization and Tar Production.

A FORTNIGHT ago, in our editorial columns, there was mention of the appeal that the Ministry of Munitions were making to gas undertakings to produce as much tar as possible. The suggestions officially made for realizing the requirement were two—the shutting-down of water-gas plants, excepting in so far as they were necessary to meet the demand for gas in excess of the capacity of the coal-gas plants, and the reduction of the temperature of carbonization. At the time we remarked that, in complying with the latter suggestion, numerous difficulties would certainly be encountered, more particularly in view of the already shortening days, and the daily move towards the heating season. There was also in mind the fact that lower temperatures meant an additional quantity of coal to be handled and carbonized, the shortage of labour on many works notwithstanding, as well as the fact that materials, labour, and capital have, through war-imposed conditions, conspired to prevent on many works extensions of plant, and the observation of the ordinary standard of upkeep.

Apart from these disabilities, there is a second consideration. Nothing is said by the Department concerned as to the quality of the tar required; quantity only being mentioned. But to lower the carbonizing temperatures would, in the first place, increase the paraffins in the benzol, and this would affect the question of its suitability for explosives purposes. It is therefore easy to assume that the new request is due to requirement in some other direction than explosives. But this does not alter the consideration that, in this matter of the drop of temperature of carbonization, one cannot serve two masters with maximum efficiency.

A further consideration, and a very vital one, comes in. It may be prefaced by saying that the temperature of carbonization cannot possibly be dropped to a sufficient extent to do any good in augmenting tar production per ton of coal without jeopardizing the supply of gas in not a few areas, and making the coal gas process such an expensive one per ton that—more especially in present circumstances—some gas-works could not possibly live without very considerable assistance. But increase of tar production per ton of coal is not the only point. An augmentation of the quantity per ton of coal does not necessarily mean an increase in the bulk. Since the suggestion was promulgated that a lowering of the temperatures would give the quantitative increase desired, brains have been examining the position, and have come to the conclusion that reduced temperatures would defeat, and that seriously, the very object that the Ministry have in view in making their recommendation. In the first place, reduced carbonizing temperatures mean a reduction of carbonizing capacity per unit of plant; and there is a limit to the available coal-carbonizing plant. It follows that diminished capacity means a diminished throughput of coal; and a diminished throughput of coal, a diminished total production of tar. What is gained per ton would, and in considerable measure, be lost on the total. To put a hypothetical case. If, by reducing carbonizing temperatures (say) by some 400° Fahr, the quantity of coal carbonized in a given plant is nearly halved, the total gas made is reduced by more than one-half, and the total quantity of tar is reduced by upwards of one-third, then how will the lower temperature work profit the Ministry of Munitions in the matter of an increased production of tar, or in maintaining the production of benzol and toluol? Not only would there be less tar made, but there would be less coal gas to wash for benzol, more coal to be carried, and more labour needed to deal with it. Looked at in this way, there would be an actual and heavy sacrifice of precisely what the Ministry are asking for, to say nothing of the putting of additional difficulty upon an industry already surcharged with troubles developed by the war. The better course to pursue is to continue to urge householders and industries to consume gas in place of coal, and so enable the gas undertakings to economically carbonize as much coal as plant will permit at their ordinary temperatures. In this way, the Ministry of Munitions would get the quality benzol they require, and at the same time an enormously larger bulk of tar per unit of carbonizing plant and per unit of time, if not per ton of coal. The question is one for very serious consideration.

The Appropriate Time for Sliding-Scale Revision.

THERE is a pretty general feeling now among the leading administrators in the gas industry that the sliding-scale must be amended to meet new conditions. The hard logic of present facts and of prospective circumstances is too much even for those who actively resisted some time ago (when things were less serious) all the advances made to get a movement on towards what has been proved, with uncomfortable vehemence, through lost dividend and depreciated market values, to be very desirable. Gas proprietors, it is also frequently noticed now, and not with surprise, are becoming restless; and there is not the slightest doubt that among some people who are investors for the sake of income, the gas industry is gradually losing reputation. This alone is a grave matter for an industry that is anticipating a large expansion of business, and consequently a considerable demand for capital, and which industry, with its fortunes dependent upon economy, must do its utmost to maintain attractive conditions for obtaining capital on the best possible terms. It will take a large amount of eloquence and a considerable span of time to wipe away the gloomy feelings that are being engendered as to gas dividends not being altogether so safe as was believed under quondam conditions. However, the discussion has done some good in promoting unity of opinion that the terms of the sliding-scale must undergo modification. The principal question now at issue is as to the appropriate time for pressing the matter upon the attention of Parliament, and appealing for the righting of what has become a gross injustice, inflicted by a (in past normal times) useful piece of legislation, but every fundamental condition of which has in recent times been undermined.

That is the point over which difference of opinion now prevails. Some of those most ardent in the belief that there must be revision are the most difficult to move from the stand they are making against approaching Parliament during war time. Their responsibility is great; for they happen to be those who, representing the largest gas capitals under the sliding-scale, must lead in any appeal made to Parliament. The Chairman of the South Metropolitan Gas Company (Mr. Charles Carpenter, D.Sc.) is one of these. He recognized long since the want of harmony between the sliding-scale and the new conditions; but what appears to have happened in his case, as well as in others, is that the first approach to a Government Department, resulting in a courteous intimation that the time was inconvenient for any change, has damped-down perseverance in effort in every available direction to get the wrong immediately righted. No time ought to be inconvenient for supplanting an injustice by justice. A Parliament that has time for considering, during the progress of war, such trivialities as the existence of a grille that concealed fair

beauty from the eyes of the politicians—real and otherwise—below, ought surely to be able to find time to help to redress an injustice that in its worst form is a product of the war. Mr. Carpenter, at the meeting of the South Metropolitan proprietors last Wednesday, touched upon the subject of the sliding-scale. In his reply to the discussion following his address, he admitted that the Board are alive to the hardness of the operation of the sliding-scale where stock is held by those least able to bear the loss of the substantially reduced dividend. But he said this reason would not be considered sufficient by Parliament. Prior to that, having agreed that in war time the sliding-scale is out of date, he observed: "I think Parliament would be sympa-"thetic." This is a contradiction of the inferred present indifference. Nor is there any need to ask Parliament to consider the case solely from the point of view of effects, but to consider it as well from the point of view of causes. And if Parliament has any sense of justice, it will see to it that an industry so hard hit by the war, through the operation of a now inconsistent enactment, is given some temporary relief, pending the larger question of a permanent readjustment of terms to conditions, and this to an industry whose ill-rewarded capital is being largely used for national purposes.

Read down the impressive speech of Mr. Carpenter, and an amplitude of causes will be found there which have produced the gloomy effects for gas stockholders. The Chairman points to the regulation of the price of coal, and places it to the credit of Parliament, to whom for it the gas industry ought to be profoundly thankful. Agreed. But Parliament only did half its work for gas undertakings using seaborne coal by not dealing with freights. The good in one direction was negatived by omission in another. The huge coal stocks now being laid down by gas undertakings are a protection not only to them but to the community at large, and they are a national assistance. They are costing money, and not earning interest before the period of use. Again, there is the heavy cost of war allowances representing in the case of the South Metropolitan Company last half year 4d. per 1000 c.ft., and now about 5d. Is this the maximum? Is there any assurance that there will be no other supervening costs? Is there any confidence that the lean dividends now being distributed by the London Companies will not be subjected to a still higher income-tax? The Board of the Company think that in the directions of coal and labour the peak of the costs have been reached. Twelve months or so ago, the Board reduced the price of gas 2d.; this year they have increased it 5d. They acted in the light of their then current circumstances; but the uncertainties of the position are well illustrated. So long as present costs continue to represent the peak, Mr. Carpenter does not see how we could expect any relief from Parliament while the war rages. Is, then, the present dreary position for gas investors the dividing-line between appropriate relief and inappropriate relief? If so, then the process of depreciation and the burden of hardship are allowed a long spin and the attainment of remarkable dimensions in effect before rectification is admissible. The Gas Light and Coke Company are paying £3 14s. 8d. p.ct. per annum, less income-tax, which makes the net payment about 3 p.ct. This for an industrial undertaking cannot rank as plethoric. The South Metropolitan Company will only be paying 4 p.ct. next Christmas, less income-tax. There is every reason, says the Chairman, to think that the Company will get through to the termination of the war at no lower rate, in which case he thinks the proprietors will have cause for congratulation, despite the very obvious hardships the reduced figure entails. The Commercial Gas Company are paying a dividend of £4 8s. p.ct. on their 4 p.ct. stock, and 4 p.ct. on their 3½ p.ct. stock. The Chairman (Mr. W. G. Bradshaw) says it is, unfortunately, impossible to say that the Board will not have to raise the price still further. A microscopic examination of the position or an examination by comparison with other industrial concerns hardly carries conviction as to the existence of any ground for congratulation to the recipient of a 4 p.ct. or lower dividend, less 5s. income-tax. There would be greater cause for congratulation if Parliament could be induced to adopt a temporary scheme of relief, with the matter of permanent readjustment deferred for deliberate investigation later.

On the excellent case that Mr. Carpenter's address furnishes to the contrary, he cannot see that this is as good a time as after the war for seriously tackling the matter in Parliament. Perhaps the proper time for considering the terms of peace will be after the remembrance of the transgressions of the enemy against all human and higher laws have been softened by the emollient Time. On the other hand, Mr. A. M. Paddon regards the present as the most opportune time imaginable; and during the discussion at the meeting he gave cogent reasons for his belief. There is danger in putting off till the morrow what should be taken in hand to-day, and taken in hand perseveringly. Meantime, gas proprietors in various great concerns are asked to be of good cheer, as the thin dividends reach them.

Meeting of the Irish Association.

The members of the Irish Association had an attractive programme last week for their meeting, held under the presidency of Mr. A. S. Brook, of Lisburn, whose experiences in various places under differing circumstances enabled him to compose a Presidential Address treating from a broad point of view of several matters of current and general importance. Naturally during the address and at various parts of the meeting, coal and freights came in for considerable comment; and the limited assistance that the Irish gas undertakings have obtained in these directions—despite their representations—is the ground of grievance which cannot be called unreasonable. In their circumstances, they are totally unable to help themselves in these matters. During the war they are particularly the victims of their geographical condition in relation to the coalfields; and, instead of costs for coal and freights descending as a result of their appeal for help from the "powers that be," freights at any rate have, even within the past year, made still further ascent, till now the President is able to say that in the West of Ireland some six times the pre-war rate has been paid. Within the year (so Mr. J. Paterson, of Waterford, states) freights have added another 30 p.ct. to their former girth. On top of these conditions, stocking for the winter is a seriously expensive operation. Altogether the position is a crippling one for many of the concerns. Whether any good could be done in the way of relief, by the formation of a Commercial Section—which should go further, according to a proposal submitted to the meeting by Mr. J. T. Reid, than Commercial Sections have gone before—cannot be said. In the circumstances of Ireland, he thinks a Commercial Section might be developed that could be, in addition to the customary functions of such a body, a co-operative purchasing organization for gas concerns. This might do some good in current circumstances; but we can see the intricacies of the new situation would not be slight, and the organization would want very careful handling and working. However, there was divided opinion among those who took part in the discussion as to whether such a new venture should be made; but we rather think Boards and Committees will want a say in this matter before such a section is floated, and its scope and functions clearly defined. At the meeting nothing was settled. It is hardly possible, however, that such an innovation, while it may have the sympathy, would be participated in by the largest undertakings of the country, seeing that they are of sufficient calibre to look after themselves, and would not want their dealings complicated by external considerations.

However, the difficulties of the administration of gas undertakings in Ireland are not light in normal times, and they are almost back-breaking now. Mr. P. J. Philpott pictured some of them in his paper on exceptional difficulties that he has met with in the administration of the Mallow gas-works. But some of the difficulties experienced at the smaller gas-works are traceable to heavy capital expenditure in relation to business done, and to deficient upkeep of plant and reticence (through the weight of existing capital) in adopting more economical processes. The heavy capital in the case of some of the local authority owned undertakings, the President puts down to the extent of the purchase money and the cost of the opposed parliamentary proceedings that authorized the transfers. It is through this that a few local authority gas undertakings do not stand so well as is generally the case in a comparison with local electricity concerns that have had fairly modern birth, and into which the local authorities went *ab initio*. The President sets his face against gas-works purchase unless it can be without opposition in Parliament and without expensive arbitration—seeing that money is squandered that should be put into, and not hung as a weight upon, the works. But local authorities are not now so keen over buying gas undertakings. Companies are loth to part; and the property fetches good money. Moreover, it is very rarely now that local authorities can find the excuse of want of enterprise with which, and therefore the

ground of public policy upon which, to approach Parliament for purchase powers. We will give electrical competition credit for having stimulated sleepy gas administrations, and made them put energy into the development of a business that has commodities to sell of immense importance in our modern life and national development. Another thing is that economical manufacturing processes are not to-day an exclusive privilege of the larger concerns. They can, as opportunity allows, be adopted by every gas undertaking—company as well as local authority. A paper bearing upon the question of economical production, and upon that of economical utilization of coal in gas-works, was the one read at the meeting by Mr. F. G. Ambler, on intermittent vertical retorts for medium-sized and small gas undertakings. Particularly interesting is the part of the communication that deals with the two-hour steaming of the charges at the rear end of the carbonizing period—thus producing as a diluent a gas containing about 6 p.ct. of inert constituents, and having a calorific value of 328 B.Th.U. The tables accompanying the paper, giving authorized data from named gas-works, are remarkably satisfactory and very edifying. The working certifies high gas makes, calorific values to which no one can take exception, and a percentage of incombustibles that is a very favourable recommendation to the process. The figures, as well as the remainder of the paper, are well worth study. But there is just one question regarding the steaming; and it is, What is the effect upon the stability of the coke?

Purifier Efficiency and the Direct Sulphate Process.

The portion of the annual report of Mr. W. S. Curphey, Chief Inspector under the Alkali Works Regulation Act, which reviews his continued researches into purification inefficiency and the loss of ammonia where the direct process of sulphate of ammonia production is in use, places the gas profession under a further obligation to him, and not only those members of it who have the "direct" process in operation but others, because purifier inefficiency exists elsewhere, and the investigations show that it is capable of improvement. The direct process of sulphate of ammonia production is a comparatively new one in the gas industry; and, though previously in use in the coke-oven industry, the same problems do not arise there, owing to the absence of the need to pay special attention to the question of the purification of gas by oxide. However, the continued investigations (although still incomplete) prove that a year ago Mr. Curphey had already obtained a good grip of the problems that have presented themselves, and that his suggestions for improvement in both directions were on the right track. The proof is found in the actual enhancement of results where the suggestions have been applied. But there is not so far complete satisfaction on the part of the investigator; and he has yet to "run to earth" certain pertinent matters so as to justify definite conclusions. He has, however, arrived at a stage where he is forced to the opinion that data from large scale working—subject as this working is to a disturbing diversity of conditions, and therefore of inexactitude—will not enable a complete determination of the effect on efficiency of various factors, and that it is essential that large-scale tests should be made in the laboratory, in order to secure reliable data. He has himself made a beginning with this work; but he appeals to gas-works' chemists to assist him to elucidate some of the many questions calling for study, seeing that they have experience and facilities for research which must far exceed those available to one entering into the subject from (as it were) outside the industry.

Those engineers and chemists who are following up the results of Mr. Curphey's researches will remember that—apart from the loss of ammonia with the direct process—he found that certain conditions which are necessary for purifier efficiency are attacked and depreciated by the direct process. But the attractions of this process cause him and others to indulge the hope that these conditions can be surmounted. Indispensable to good working is regularity of operation and chemical supervision, which is a point that is being intensified day by day, since gas-works are becoming more and more chemical works, and the efficiency of every one of the processes rests upon a chemical basis. As to the matter under observation, purifier efficiency depends very largely on the percentage of moisture in the oxide and the temperature—regard also being had to such factors as the relation of purifier area to gas make, rate and direction of gas flow, the condition of the gas itself in regard to ammonia and oxygen content, the absence of soluble salts of iron, and the physical condition of the oxide other than humidity. With the direct process of sulphate production, it is found that the crude gas leaves the acid bubbler at a relatively high temperature and highly charged with moisture. The acid content of the bubbler, too, varies within wide limits; and the surface layer—the last in contact with the gas in the purifying system—has at times been found alkaline, while the bottom layer has been highly charged with acid.

Another condition which contributes to bad purifier working is through the oxide of iron being delivered, and put into immediate use, with a moisture content sometimes of upwards of 50 p.ct. The purifiers may also be in exposed positions, subjected to great changes of temperature; and they may be worked in sequence, with an upward flow of gas. Some engineers—like Mr. W. C. Jones, at the meeting last October of the Midland Gas Association—contend that they get better results with a high percentage of moisture in the oxide; but where this is the case, as in his, there are usually exceptional conditions prevailing. This being so, there must be care in accepting conclusions empirically derived, without investigating the circumstances to see if there is any special reason for the experience. Mr. Jones will read Mr. Curphey's criticism with interest, will observe how the conditions of his purifiers were such that, though he has a preference for a moisture content of from 50 to 60 p.ct., his system is one which tends to lose rather than to gain moisture, and will perhaps consider where the large tonnage of water really disappears to. Of this there is certainty, that Mr. Jones could not use his purifiers under the conditions described with the direct system of sulphate making. Of course, in all purifier boxes the contents are progressively undergoing change; but Mr. Curphey's further investigation convinces him that, the closer one can maintain a suitable degree of hydration of the oxide, the better. It will be remembered that last year he suggested 5 to 10 p.ct. of moisture; this hydration having regard rather to the reactive ferric hydrate content of the mass than to the total mass of material, active and inert. Subsequent research does not lead him to depart from his conclusion in this respect; as a matter of fact, at two works that have been under special observation with the direct system of sulphate of ammonia production in operation, the result of using drier and matured oxide has been that all previous purification results have been "far "exceeded. This points to the need for fresh oxide being stocked and brought into condition preferably in the summer months, and not put into use in a fresh and highly moist state at periods coinciding with maximum gas makes, with an exceptional amount of ammonia needed to maintain the oxide in a neutral condition. Experiments in a model purifier on the sulphiding of hydrated oxide, so far as they have gone, indicate that "oxide of 16 p.ct. moisture—corres-"ponding approximately to $Fe_2O_3 3H_2O$ (16·8 p.ct. moisture) "—is markedly more efficient than equal volumes of oxide "containing 37 p.ct. of moisture ($Fe_2O_3 6H_2O$) and oxide "dried at 100° C. (Fe_2O_3) respectively, at both high and low "temperatures."

Turning to the question of oxide temperature, this was dealt with in the suggested conditions governing purification in last year's report, and reproduced in this. Briefly, the conclusion was that a working temperature of 70° to 80° should be suitable under ideal conditions; but results now indicate that, given proper conditions, temperatures much exceeding the limits named are consistent with efficiency. Mr. Curphey has a justifiable cause of complaint. He does not make it pointedly, but suggestively. He cannot find that purifier temperature has received any adequate study; and such as there has been has not been made with due regard to the varying temperatures that prevail through the conditions obtaining in relation to the purifiers themselves. Boxes differ the one from the other; one grid from its neighbours; exposure has a varying effect upon temperatures near the lids and the sides; and moisture condensation (especially with the direct process of sulphate making in use) has on the oxide contiguous to the lids and sides a noticeable effect on temperature. Temperature study should be made in the oxide itself; and Mr. Curphey has been doing this with thermometers attached to metal rods sliding in fixed tubes. These show the great variations of temperatures that take place. Though the rise of temperature in the middle layer or central portion of the oxide—not being subject to the same disturbing variations of temperature as the others—affords the better indication of the progress of purification, he cannot say that the records furnish any particular guidance as

to the progress of purification, nor do they supply a means of anticipating periods of purification disorganization. Thus Mr. Curphey, so far as the experiments are concerned, has to fall back on the generalization that, while undoubtedly rise of temperature (under all conditions of hydration) favours purification, a suitable temperature *per se* is insufficient to secure regularity of working. Other factors operate, such as those already mentioned.

The question as to the amount of ammonia that should be supplied to purifiers (in which connection there has been considerable waste by an uncontrolled supply) is also one of some difficulty, and requires further investigation. Mr. Curphey's experiments have not yet resulted in any determinate results; but, so far as he has gone, they have convinced him that the only proper means of regulating the amount of ammonia to the requisite degree is by test. This is a rational finding, in view of the fact that it is the chemical condition existing in the purifiers that calls for the admission of ammonia. But as to the need for ammonia, from the experiments made there appears to be good reason for believing that the amount required to maintain the oxide in a state of neutrality, or slightly alkaline condition, bears direct relationship to the quantity of ferrous sulphate formed, and that the formation of ferrous sulphate is favoured by excessive moisture and possibly low temperature. The detrimental effect of ferrous sulphate upon the activity of the purifying material, and its retarding action upon revivification, are mentioned. There is a calculation as to the quantity of ammonia required under certain hypothetical conditions; and it is shown that, where the direct process of sulphate of ammonia production is in use, an amount of ammonia far exceeding the quantity present in crude gas is needed during the periods of purifier disorganization. As to the admission of the ammonia, Mr. Curphey is inclined to pass in part of it to the second box instead of all to the first one. But tests have not yet permitted a final decision.

A few words upon the question of the low recovery of ammonia with the direct process. When Mr. Curphey first considered this matter, he was rather of opinion that the uncontrolled use of ammonia in the purifiers was responsible in great measure for the low yield. Further investigation, however, appears to have modified this view. It has been found that the stills are too often worked with little regard to the need of maintaining a regular and adequate supply of lime to the "fixed" section, and generally that the due regulation of the steam and the efficient working of the condenser receive too little attention. Examination of the effluent spent liquor revealed that very serious loss of ammonia was taking place at certain works, that this ammonia was chiefly present in the fixed form, and that insufficiency of lime was responsible. When it is found that no less than the equivalent of 3 to 5½ lbs. of sulphate of ammonia per ton of coal carbonized is being run to waste, this accounts for a good deal of the deficiency as compared with the ordinary system of working; and yet the operation of the stills is not a difficult matter even for unskilled men. There is another point bearing upon this matter. Mr. Curphey asks the question whether there is justification in assuming a regular figure as a standard of 28 to 30 lbs. of sulphate of ammonia per ton in the absence of reliable data regarding the actual amount of ammonia that leaves the retort? Of course, there is not. Some of the small works using the direct system probably obtain coal that is not the best for either primary or secondary product making purposes. But it is economical for them to do so. Just now, too, with the large percentage of inert material that is being sent out with (and as) coal, most works are finding both quantities and qualities of products suffering severely. It is only fair to bear these conditions in mind; at the same time Mr. Curphey has found that there is a substantial loss of ammonia in the direct system which is subject to remedial measures. There is indebtedness to him for taking up this matter in conjunction with the more general one of purification, connected with which there are several matters that require elucidation, but which have so far been neglected by the gas industry.

Gas Composition Inquiry.

A very interesting statement was incidentally made by the Chairman of the South Metropolitan Gas Company (Mr. Chas. Carpenter, D.Sc.) at the meeting of the proprietors last Wednesday. It had reference to the inquiry that the Board of Fuel Research are making, at the request of the Board of Trade, into the subject of the composition of gas, having regard to current and future requirements, the need for certain bye-products, and other features of gas-supply development. There is a probability, which we rather suspect amounts to a certainty, that the South Metropolitan Company will be very closely identified with the inquiry, and that they will be entrusted with the plant with which the investigation will be made at one of their works. The Board of Fuel Research could not do better. The Company have laboratories and a chemical staff second to none; and an investigation of the kind is one that is after the Chairman's own heart. Whatever his predilections regarding gas supply may have been in other times and in other circumstances, new conditions have opened up new considerations. The Board of Fuel Research have in its composition technical men noted for thoroughness; and the research will without question be a far-reaching one.

The "Gas-Controller" Canard.

Someone appears to have been hoaxing the "Evening News." Perhaps our electrical friends or the coal merchants have had a hand in it; but we hope they have not been so silly. Last Monday our evening contemporary gave a front-page place to the statement that the extent to which gas for cooking purposes has been used this summer in London in place of coal, and the prospect of more gas being consumed for heating during the autumn and winter, may lead to the appointment of a Gas Controller. While the Government, it was stated, were anxious to see gas employed for cooking and heating, as well as lighting, there is no desire to see it wasted. There has not been much opportunity for "waste" this summer. People must cook; and the price of food has exercised a restraining influence on the quantity cooked. There has been no need for heating; and the Summer Time Act has kept down the consumption for lighting. What has happened is that the saving-up of coal for winter has led to kitchen coal ranges being used less, and the gas-cooker more, which is in compliance with the request of the Ministry of Munitions, and fits in with the plans for winter of the Coal Controller. The more people use gas, the greater the output of coke for fuel and of other secondary products for munition and agricultural purposes. As to the waste, the visits of the meter readers and the account collectors will prevent this going on to any great extent. But the fact remains that, however wastefully gas may be used, the coal that is carbonized to produce it cannot, in present circumstances, be said to be wasted. Those who know the facts and the character and extent of national requirements know best that this is so. It will have been observed that the paragraph in the "Evening News" is not an official announcement, and that it did not appear in other papers. And, so far as can be gathered, there is no truth whatever in the suggestion as to the probable early appointment of a Gas Controller.

The Government and Petroleum Supply.

Information was quoted in our editorial columns last week which does not give to users of oil (the gas industry among them) any very great hope regarding the prospect of increased importations in anything like the probable rate of new demand; and, as a matter of fact, the time looks like having an unpleasant proximity when, unless something unforeseen happens, America may come to the conclusion that, as charity begins at home, its best course will be to conserve its stores of oil for home consumption. Petrol consumers are getting fidgety regarding not only the present position, but the outlook; for they can see the rapid output of motor cars in America—the absorption of petrol there is already big—putting them in a pretty predicament. The British Government, too, have awakened to the fact that they should do something in the way of making this country as oil-producing as possible, in order to reduce our reliance upon importations. They should begin at the point of least resistance by encouraging in every possible way the existing coal-carbonizing industries. The encouragement so far does not strike one with any noticeable force. But now the Government are contemplating surveying the country and drilling it for petroliferous areas. The Secretary of State for the Colonies (Mr. Walter Long) last Wednesday introduced the Petroleum (Production) Bill, which contemplates giving the necessary authority to expend money for the purpose. The House does not require the importance of the question urged upon them. The importance is well known. But

members were interested in learning that, in connection with this matter, Mr. Long has secured the services of Sir Walter Egerton, Sir Evan Jones (Controller of Petrol Supplies), and Prof. Cadman. Also that the Colonial Secretary has made up his mind that the worst features of the American development of natural oil supplies shall not be repeated here. That development has been accompanied by a prodigious waste of capital, a premature depletion of the oil-fields, and a terrible waste of oil owing to competitive drilling. It is hoped to pass the Bill into law on the re-assembling of Parliament after the recess.

LIMITATION OF GAS AND ELECTRICITY SUPPLIES IN GERMANY.

No Final Stipulation Yet.

WE are enabled to publish this week—through the help of the correspondent to whom reference was made last week, p. 269—two translations of further articles in a German newspaper dealing with the projected limitation of gas and electric lighting in Berlin.

EXTRACT from the "VOSSISCHE ZEITUNG" of AUG. 4.

LIMITATION OF LIGHTING.

The President of Police informs us as follows: "The increasing shortage of coal makes it necessary to limit the use of gas and electricity as much as possible in dwelling-houses and flats. In agreement with the Government Commissioner for electricity and gas, I urgently request that all lamps that can be dispensed with be put out of use, and that those that are indispensable be lighted only as long as absolutely necessary. All lighting which merely serves for pleasure or comfort must cease. I hope and expect that this warning will be observed by all; so that decrees, the non-observance of which will be punishable by fine, may be avoided."

Further, the President of Police orders that the limitation of interior lighting in hotels and guest-houses be applicable also to the bedrooms. Accordingly, the lighting of the bedrooms of hotels must only amount to one-fifth that of the middle of December, 1916. The electric lamps put out of use are to be taken out of their sockets and put in a place of safety by the proprietor. The table and bedside lamps may remain.

These stipulations come into force on the 15th inst.

EXTRACT from the "VOSSISCHE ZEITUNG" of AUG. 5.

GAS LIMITATION—NO FINAL STIPULATIONS YET.

Up to the present, there exist only the general lines of guidance published by the Government Commissioner (Professor Kübler) on the 26th of July. The local detailed conditions, which are left to the special confidential officers—subject, of course, to the approval of the Government Commissioner—are still wanting. It is, indeed, not so easy to make uniform stipulations for Greater Berlin which will suit all cases.

The inconsiderate execution of the orders to limit the quantity of gas in private houses by one-fifth of what it was formerly would undoubtedly occasion many hardships. Those who have already observed a warning given last year to "Save your Lights in the Interests of the Fatherland" will find it very difficult to go still further in this direction.

The Government Commissioner has referred to the great increase in the consumption of gas caused by the limitation of the central hot-water supply. But in many households hot water—think of the dish-washing, &c., to say nothing of the weekly bath—is absolutely indispensable. Such increased consumption, which simply arises from the fact that the landlord has raised no protest against the partial cessation of the hot-water supply which he is under contract to furnish, is now to be especially liable to a fine of 50 pfg. per cubic metre for every metre used in excess of the quantity allowed.

Well-to-do people are not likely to be specially affected by the limitation of the gas supply. Let us glance at the following figures: At present there are in Berlin 237,700 coin meters, which have each an average annual consumption of 303 cubic metres. There are besides 301,200 ordinary gas-meters with an average annual consumption of some 390 cubic metres. In addition there are 24,000 consumers with an average consumption of 3300 cubic metres. This shows clearly that the Corporation works chiefly serve small consumers. In consequence of the shortage of coke and other combustibles, small householders in Greater Berlin have taken to using gas; likewise they have exchanged the petroleum for the gas lamp.

It has long been pointed out by experienced technical men, who certainly would not favour an extravagant consumption, that gas-rationing is absolutely unnecessary. The gas-works—especially those of Greater Berlin—could supply all reasonable demands if the mines did not first of all supply, and in full measure, their coke-ovens. At the time of the greatest scarcity of coke in Berlin, Westphalia had a stock of 1,800,000 tons. It is to be hoped that a change will be made in this direction.

However, we must now rest content with gas rations. On account of the poor calorific value of the gas, the authorities have decided on a limitation to the extent of 10 p.ct. They will also, as far as possible, pay some regard to the wishes of the work-women. The protraction of the discussion certainly tends to prove that they will, as far as it goes, meet the wishes of the consumers.

PRICES OF GAS TO DIFFERENT CLASSES OF CONSUMERS.

The Lea Block-Rate System.

IN a paper presented to the Missouri (U.S.A.) Association of Public Utilities, Mr. J. E. M'Leod enlarged upon the difficulties connected with the preparation of equitable and uniform rates for various public services, and described a system adopted by the gas companies at Laclede and some other places, known as the "Lea Block-Rate System." While simple and easily understandable by the consumer, in its final form, the preparation must have involved elaborate analysis of working expenses and conditions of consumption—including as it did many debatable estimated charges.

The difficulty mentioned—due to the fact that scarcely any two consumers require precisely the same service in all respects—is obvious to those concerned in the supply, but not generally appreciated by the public, whose ideas of fairness are limited to "one price for all alike," regardless of the many varying factors of expenses in one case as compared with another. The point was illustrated by examples from the postal, railway, and telephone services. The gas consumer may be close to the gas-works or miles distant. He may draw on a comparatively small service and meter, for the full delivery capacity during twelve hours out of the twenty-four, or have a large long-service supply and a 200-light meter to serve as a mere stand-by. Such conditions had a marked effect on the actual cost of each individual consumer, and were independent of the quantity of gas consumed. That one uniform price did not meet all modern business requirements, was shown by the common use of differential prices, based on the quantity used, or on the nature of the consumption.

These facts had led to the consideration of the possibility of preparing price schedules founded on fair and scientific principles, and on the basis that each consumer should pay all the expenses incidental to his individual demand, *plus* a fair return on the capital outlay. Such a system had been developed by Mr. Henry L. Lea, of Chicago, and was adopted as a means of eliminating many of the inequalities in the customary methods of charge—offering as it did substantial inducement to increase of consumption and hours of burning, and avoiding the complaints of discrimination that arose when a different price was charged for the same product according to the purpose it was applied to.

The customers were divided into the smallest possible number of classes, according to capacity of service as compared with the maximum hourly consumption; and the cost of service to each class was ascertained by a full analysis of the working expenses. There may be some difference of opinion as to procedure, but the methods followed in the Milwaukee case could be safely followed. The chief difficulty would be the fixing of a fair return on capital outlay, which was put at anything between 4 and 10 p.ct., according to the interests or prejudices of those concerned, but had been recognized by Congress as 8 p.ct. Seeing that a fixed rate of profit offered no inducement to the Company for the improvement of existing conditions, he suggested that excess profits, if earned, might be equally divided between the consumers, the shareholders, and the employees.

An average sum sufficient to cover the fixed charges and cost of manufacture, would give a fixed initial or minimum charge for each group. Expressed in terms of 1000 c.ft. of gas, this was called the initial volume, and was followed by a secondary volume, usually common to all classes of consumers. The production and profit having been covered, any excess could be supplied at a much lower price—thus encouraging increased consumption, and the spreading of it over longer hours. The initial volume was based on a load factor and the size of the meter; and for convenience there might be four groups, as shown by the following scheme adopted at Laclede:

CHARGES FOR GAS USED THROUGH ONE METER IN ONE MONTH.

Initial volume, 75 c. per 1000 c.ft.; secondary volume, 55 c.; all additional consumption, 45 c.

Group I. would include consumptions of 200 c.ft. per hour or less; Group II., 200 to 800 c.ft.; Group III., 800 to 2000 c.ft.; Group IV., 2000 to 3000 c.ft. The initial volume would be respectively, 7800, 11,100, 20,300, and 37,400 c.ft.; and for a meter capacity over 3000, add 1000 c.ft. for each 100 c.ft. additional capacity. The secondary volume to be 6800 c.ft. in all groups.

A scheme prepared for one district, on this system, is peculiar to it, and not applicable to others in which the conditions might be quite different.

South Metropolitan Company's Issue of Redeemable Preference Stock.—In another part of to-day's issue will be found particulars of the issue by tender of £250,000 of 5 p.ct. redeemable preference stock of the South Metropolitan Gas Company. Tenders (to be sent in by Friday next) must be at or above the issue price fixed by the Directors—94 p.ct. The stock will be redeemed by the Company at par on Dec. 31, 1924, and will rank next after the debenture stock of the Company from time to time existing or authorized.

COMPARATIVE WORKING RESULTS OF THE TWO METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED JUNE 30, 1917.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	7,480,980	1,912,579	1,417,013	1,356,531	1,314,023
Increase . . . . . per cent.	12·09	8·05	9·74	17·10	·03
Gas made per ton of coal . . . . . cubic feet	12,498	13,745	12,694	11,900	12,648
„ „ per gallon of oil . . . . . „	..	574	480	638	614
Gas unaccounted for . . . . . per cent.	2·26	7·98	5·09	8·32	5·13
Coke made for sale per ton of coal . . . . . cwt.	10·14	11·29	10·67	8·82	8·49
Tar made per ton of coal . . . . . galls.	9·67	10·53	8·58	..	8·76
Liquor made per ton of coal . . . . . galls, 8 oz.	40·72	35·26	27·77	32·64	..
Percentage of coke used as fuel	17·41	13·13	14·65	29·41	29·85
Capital expended per 1000 cubic feet sold during the past year	s. d. 8 2·60	s. d. 8 4·60	s. d. 7 6·85	s. d. 8 8·97	s. d. 9 0·84
Price charged per 1000 cubic feet	2/8	2/8 and 3/-	2/0 to 3/6	2/10 to 4/7	2/8 and 3/9
Costs per 1000 Cubic Feet of Gas Sold.					
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.
Coals, oil, &c.	28·09	26·93	27·78	29·36	25·73
Less residuals—Coke and breeze	11·97	9·23	10·78	9·32	6·25
Tar	2·82	1·87	2·30	1·40	1·16
Amm. liq. and sulph. amm.	3·00	2·35	1·58	2·04	·68
Total residuals	17·79	13·45	14·66	12·76	8·09
Net for coals, oil, &c.	10·30	13·48	13·12	16·60	17·64
MANUFACTURE—					
Salaries	·70	·50	·38	·52	·27
Wages—carbonizing	1·88	1·80	2·17	1·58	2·34
Purification	·48	·25	·20	·58	·32
Repairs—plant	4·05	3·68	4·15	3·63	4·36*c*
Net manufacture	17·41	19·71	20·02	22·91	24·93
DISTRIBUTION—					
Wages and salaries	·78	·90	1·17	1·31	·77
Repairs—Mains and services, &c.	1·23	1·22	1·44	1·39	1·82
„ Meters and prep. meters and fittings	1·66	1·95	·62	1·56	1·70
„ Stoves—ordinary and prepayment	1·07	1·61	1·16	1·23	1·07
Total net manufacture and distribution	22·15	25·39	24·41	28·40	30·29
Public lamps—lighting and repairing	·46	·44	·43	·46	·12
Rents, rates, and taxes	2·52	2·19	1·08	1·78	1·17*d*
MANAGEMENT—					
Directors, Auditors, and salaries (Secretary, &c.)	·22	·32	·50	·67	·42
Collectors.	·62	·97	·42	·48	·49
Stationery and general charges	·53	·57	·54	·31	·42
Profit-sharing	·47	·31	·28	·22	·09
Bad debts	·03	·03	·06	·03	·02
Law and parliamentary charges	·02	·01	·03	·07	·07
Superannuations, &c.	·45	·34	·31	·37	·41
National Insurance	·13	·08	·08	·06	·04
Active service allowances and war bonus	3·34	·45*a*	3·28	2·53	1·56
Sundries	·04	·01	·02	..	..
Total expenditure (*less* residuals)	30·98	31·11	31·44	35·38	35·10
GAS	31·78	31·76	30·16	36·94	34·82
Rentals—Meters and prep. meters and fittings	3·36	2·68	2·59	2·00	1·80
Stove	1·31	1·81	2·36	1·77	4·08
Incand. mantle maintenance	..	·10	·12	..	·03
Miscellaneous	·05	·00	·01	·03	·07
Total—Gas, rentals, &c.	36·50	36·35	35·24	40·74	40·80
Balance, being profit	5·52	5·24	3·80	5·36*d*	5·70
Dividend and interest	6·66	7·18	6·05	6·24	5·05*e*
Surplus or deficit	Def. 1·14	Def. 1·94	Def. 2·25	Def. ·88	0·65
Contributions to funds and sundry payments	..	..	..	..	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	28 1·62	27 11·55	27 5·68	..	26 9 15
Coke realized per ton of coal	11 8·97	12 11·43	11 11·14	10 4·06	9 5·74
Coke „ „ of coke	23 2·10	22 11·27	22 4·32	23 5·20	22 4·08
				Per Yard.	
Breeze „ per ton	3 11·39	3 0·31	6 2·30	2 7·49	2 7·28
Tar realized per gallon	0 3·50	0 2·76	0 3·17	0 1·88	0 2·14
Amm. liquor, &c., realized per butt (8 oz.)	7 11·54	10 3·09	7 3·80	7 7·66	..
Percentage of stoves at rental to consumers	102	76	97	108	72
Bad debts per cent. on total receipts	·06	·07	·11	·05	·03
Net profit per cent. on ordinary capital	3·60	2·80	2·68	3·98*b*	4·86
One penny variation equals in half year	£31,171	£7969	£5904	£5652	£5475
Carburetted water gas, per cent. on total make (Including Blue Gas, if any.)	..	27·30	16·73	20·59	36·77

a Active Service Allowances only.

b Tonnage Allowance 1915-16 eliminated.

c Including 0·73 to Renewal Fund.

d Rent and Rates only.

e Including 0·62 Income-Tax item.

COMPARATIVE WORKING RESULTS OF THE TWO METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1916.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . thousands	806,691	142,484	125,803	198,054	364
Increase (variation equal to) . . . per cent.	11·37	7·02	7·77	12·71	**11·31**
Gas made per ton of coal carbonized . . . cubic feet	249	**188**	**430**	**1,068**	447
Water gas made per gallon of oil used . . . ,,	..	74	25	128	40
Gas unaccounted for . . . per cent.	**·47**	**·23**	**·15**	**4·30**	**·35**
Coke made for sale per ton of coal . . . cwt.	**·82**	**·23**	**·86**	**·79**	**·67**
Tar made per ton of coal . . . galls.	**·45**	**·75**	**·80**	..	..
Liquor made per ton of coal . . . galls, 8 oz.	**·43**	**4·83**	**8·46**	**3·59**	..
Percentage of coke used as fuel . . .	**7·32**	1·79	6·87	3·95	3·04
Capital expended per 1000 cubic feet sold during the past year . . .	s. d. **0 3·60**	s. d. **0 1·37**	s. d. **0 1·93**	s. d. **0 10·81**	s. d. 0 8·16
Price charged per 1000 cubic feet† . . .	**0 2·00**	0 4·00	**0 1·00**	..	0 5·00
Costs per 1000 Cubic Feet of Gas Sold.					
REVENUE ACCOUNTS.					
Coals, oil, &c. . . .	d. 3·14	d. 5·92	d. 7·81	d. 4·51	d. 5·11
Less residuals—Coke and breeze . . .	1·27	1·12	1·56	·66	**·11**
Tar . . .	**·06**	·62	·81	·10	·03
Amm. liq. and sulph. amm. . . .	·20	·04	·49	**·09**	**·31**
Total residuals . . .	1·41	1·70	1·88	·67	**·39**
Net for coals, oil, &c. . . .	1·73	4·22	5·93	3·84	5·50
MANUFACTURE—					
Salaries . . .	**·04**	**·01**	·09	**·04**	**·01**
Wages—carbonizing . . .	**·04**	·17	·27	·30	·22
Purification . . .	**·21**	·08	**·01**	·32	**·07**
Repairs—plant . . .	**·92**	**·18**	**·88**	·38	1·15
Net manufacture . . .	·52	4·28	5·40	4·80	6·79
DISTRIBUTION—					
Wages and salaries . . .	**·05**	·06	**·06**	**·18**	**·03**
Repairs—Mains and services, &c. . . .	·05	**·20**	**·58**	**·35**	**·06**
,, Meters and prep. meters and fittings . . .	**1·27**	·04	**·44**	**·95**	·00
,, Stoves—ordinary and prepayment . . .	**·42**	·06	**·58**	**1·46**	·01
Total net manufacture and distribution . . .	**1·17**	4·24	3·74	1·86	6·71
Public lamps—lighting and repairing . . .	**·08**	·04	**·04**	**·09**	**·19**
Rents, rates, and taxes . . .	·45	·40	**·15**	**·11**	**·02**
MANAGEMENT—					
Directors, Auditors, and salaries (Secretary, &c.) . . .	**·02**	**·02**	**·03**	**·09**	**·01**
Collectors . . .	**·02**	·18	**·06**	**·05**	·03
Stationery and general charges . . .	**·09**	**·06**	**·08**	**·08**	·07
Profit-sharing . . .	·19	·01	**·08**	**·04**	**·34**
Bad debts . . .	**·03**	·01	**·02**	**·01**	·01
Law and parliamentary charges . . .	**·02**	·00	·03	·07	**·03**
Superannuations, &c. . . .	**·17**	·00	**·06**	**·15**	·09
National Insurance . . .	·03	·01	·00	·00	**·01**
Active Service allowances and war bonus . . .	1·78	·09	1·69	1·23	·44
Sundries . . .	·00	·00	·00	..	..
Total expenditure (*less* residuals) . . .	·85	4·90	4·94	2·54	6·75
GAS . . .	**1·81**	1·07	1·32	**·12**	7·00
Rentals—Meters and prep. meters and fittings . . .	·00	**·11**	**·21**	**·25**	·01
Stove . . .	**·10**	**·05**	**·10**	**·09**	**·10**
Incand. mantle maintenance . . .	..	**·01**	·00	..	**·05**
Miscellaneous . . .	·00	·00	**·02**	**·01**	·00
Total—Gas, rentals, &c. . . .	**1·91**	·90	·99	**·47**	6·86
Balance, being profit . . .	**2·76**	**4·00**	**3·95**	**3·01**	**·11**
Dividend and interest . . .	**·11**	**·88**	**·69**	**·80**	**1·09**
Surplus . . .	**2·65**	**3·12**	**3·26**	**2·21**	**1·20**
Contributions to funds and sundry payments . . .	**·72**	..	**·25**	..	**·79**
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton . . .	3 8·98	2 5·17	5 5·53	..	3 4·72
Coke realized per ton of coal . . .	1 4·12	0 6·96	0 7·98	0 3·07	0 10·96
Coke ,, ,, of coke . . .	0 10·29	1 5·63	2 9·81	2 5·39	3 7·74
				Per Yard.	
Breeze ,, per ton . . .	3 0·20	**1 6·67**	2 10·08	0 4·31	0 1·48
Tar realized per gallon . . .	0 0·16	0 0·92	0 0·92	0 0·07	0 0·60
Amm. liquor, &c., realized per butt, 8 oz. . . .	0 9·50	0 2·47	**0 6·93**	**0 10·36**	..
Percentage of stoves at rental to consumers . . .	2	3	4	7	1
Bad debts per cent. on total receipts . . .	**·05**	·03	**·07**	**·03**	·00
Net profit per cent. on ordinary capital . . .	**2·06**	**2·90**	**4·42**	**2·04**	**·47**
One penny variation equals in half year . . .	£3362	£594	£524	£825	£2
Carburetted water gas per cent. on total make (Including blue gas, if any.) . . .	..	**5·27**	**3·71**	7·76	5·79

† These figures show the variation in price in the Companies' principal areas.

ELECTRICITY SUPPLY MEMORANDA.

The Beckenham Urban District Council have made a confession. The wonderful virtues of electricity have their market price, and this market price is one that is below the maximum charge authorized by Parliament, and in many areas to-day below the cost of production. And the Beckenham Council openly make the dismal admission that, if they charged sufficient to meet the costs of production (including capital charges), it would so reduce consumption as to cause a still higher charge to fall upon the rates. A techy business is this of electricity production and supply; and an immoral one too, seeing that, even in these times when everyone is bearing heavy costs induced by the war, the municipal conductors of it say to the ratepayers who do not consume electricity: "You are, whether or not you like it, to pay part of the costs of providing electricity for your neighbours." We ask again what would happen if the supply were in the hands of a company? Simply that they would have to raise the price in order to get profits for a dividend. When it is remembered what companies would have to do, we wonder whether the Beckenham argument is not more a feeble excuse than anything else for not doing something that is disagreeable to the Council. If so, then they have to face the fact that it is more pleasant for them to do something that is unjust. And who can dispute the injustice of compelling one man to pay part of the cost of supplying a commodity to another man? The Local Government Board recommended the Council to raise the charge to the consumers rather than impose the deficits upon the ratepayers generally—including the South Surburban Gas Company, who, with their customers, stockholders, and co-partners, have their own heavy war burdens to bear. The Chairman of the Company (Mr. Charles Hunt) has his personal views on the subject of whether or not Beckenham electric light consumers can afford to pay for their own electric energy [see *ante*, p. 287] All we can say is that, if they cannot do so, then there is not a residential area to-day in which an electric supply company could possibly earn even a fraction of 1 p.ct. dividend.

Cost of Production and the Charge.

There appears to be a feeling of disquiet within the electrical industry as to what is going to be the outcome of the proceedings of the Board of Trade Electric Power Supply Committee; and all the interests concerned are now extremely eager to have their views placed before the tribunal, though just recently all were extraordinarily anxious to impugn, and did impugn, the judicial competence of its composition. According to the London County Council, the Committee are not going to fritter away their time, and spread the hearing of evidence over an unconscionable period. The Council believe that the taking of evidence will be concluded by the end of September; and so they are convoking a conference of the Metropolitan Borough Councils owning electricity concerns. The British Empire Producers' Association have been circularizing Chambers of Commerce on the subject. The Association consider that the class that deserves the prior consideration of the Committee are the manufacturers throughout the kingdom, whose business is likely, they submit, to be affected in international competition by the efficiency and the cheapness or otherwise of electrical power distribution. We think that ratepayers have an equal right to "prior" consideration, and that they should be protected once and for all against any part of "cheapness" being derived from compulsory contributions from their pockets. However, various chambers of commerce and manufacturers have been invited to support the Association, who hope to be able to present a memorandum to the Board of Trade Committee with such a strong backing that the Committee will be anxious to have from that body more detailed statements, probably from an influential deputation representing important groupings of industry. Last week in the "Memoranda," there were references to what other bodies are doing. It will not be a nice job for the Committee; it will be much worse than the one Mr. Justice Astbury recently had in hand in deciding whether or not Hackney's 20 p.ct. allowance of current for lighting to power consumers at power rates at the peak of the lighting load was giving them preferential treatment over other lighting consumers whose lighting consumption is equally beneficial to the undertaking, but is charged at a higher rate per unit. The various bodies concerned will want the Departmental Committee to jump as each one desires. But they cannot all have their own way; and this fact gives piquancy to the situation.

Uneasiness and Preparation.

As recently seen, the Board of Trade Committee have been subjected to the passing penchant of the electrical industry for administering hearty kicks. The Incorporated Municipal Electrical Association have also come in for a share. There have been sharp charges that this body—in the hour of trial, and when malformation in the industrial growth is alleged—has shown an utter emptiness in the matter of a declared policy. It should, it is urged, have given an early leading. But it did not do so. Now, through Mr. H. Faraday Proctor, the Hon. Secretary of the Association, the Council have made known their views to the members; but the members will only recognize in what is presented a réchauffé of certain more or less respected notions and desires. The Council seem to be high and dry in the matter of initiative or fresh suggestion. They urge there should be publication of the report of the Board of Trade Electrical Trades Committee and of that of the Coal Conservation Sub-Committee of the Reconstruction Committee. There is a lot of pother about the publication of the two reports, and yet there is free acknowledgment that their contents are pretty well known in the electrical profession, and have been privately well sifted to see what (if any) good there is in them. The "good" is doubtful, if "Meteor," of the "Electrical Times" [who has evidently been holiday making lately], was really serious when he wrote: "When these poor reports emerge from their bathing machines in nothing but their little bathing-drawers, the crowd on the beach will be much less inclined to salute than to duck them." However, the Council of the Association favour the appointment of a Central Board or Commission to take over the whole of the duties at present exercised by the Board of Trade, Local Government Board, and other departments, so far as they relate to the administration of the Electric Lighting Acts. Such a Central Board, it is urged, should not be authorized to own or operate electricity works. It should be a progressive body, with the interests of the industry at heart, should have complete control (subject to Parliament alone) over all such matters as the granting of powers, approval of rates of charges, formulation of rules, &c. Members should be whole-time officers, and should not hold securities in electrical undertakings. There is nothing original about this idea; it was trotted out for inspection now quite long ago at a meeting of the Institution of Electrical Engineers; and it is not a plan that commends itself wholly to those who have had experience of *ad hoc* governing Boards or Commissions of the kind. The public utility companies of the United States do not give them an unqualified good character; but the one thing that can be said favourable to them is that they do conduce to the co-ordination of legislative enactment.

The I.M.E.A. Council Speaks.

Passing from this the Council, like a good many other electrical men, favour large power stations, controlled and operated by District Boards, consisting of representatives appointed by the present statutory undertakings, with distribution remaining with the existing concerns. It is a far cry from the present state to the visioned one; and there is a large amount of capital that blocks the way. But not all electrical men are friendly to this line of development, nor are all municipalities. Many of the latter are rather in favour of their undertakings continuing self-existent from the generating end to the distribution and selling end, and not to have the municipal body simply reduced to the position of "middle men" between large generating plants and the consumers. The argument of those who advocate large generating units—but who appear to be poorly informed as to the financial issues that such stations will entail if situated long distances from the areas of consumption—is that individual considerations must give way to the need for economical production. But there are those who think that economical generation by concentration away in the coalfields is going to be largely negatived by the expenses of distribution; and, if coal carbonization is going to be amalgamated with the generating plant, then there will be still further complication in respect of costs which will modify seriously, by new and untried conditions being imposed, the anticipated economy. The Council of the Association put the matter thus—"They are convinced that, in order to secure a large and economical supply of electrical energy, it will be necessary to adopt centralized generation with large units of plant, and that the interests of all parties concerned will be best met (so far as generation and transmission are concerned) by advocating joint control and operation by District Baards." They add that "in the event of the status or remuneration of an official of any undertaking being adversely affected through the formation of a District Board, such an official shall be entitled to compensation." If they can get compensation, this would perhaps meet the views of some present-day engineers. But to what will concentration of generating plants, and the institution of District Boards assuredly tend, if not to fully qualified electrical engineers being required in very limited number. There will most certainly be a gradual decline of needs in the matter of technical attainments for all but the few; and, for local distribution and sale of current, a man of much-reduced training and status will suffice. There will be very good reason then for producing further economy by amalgamating municipal gas and electricity departments; and, where gas companies exist, it would be an easy matter for them to take over from the municipality the distribution and sale of electricity. Electricity generating plant concentration, if brought about (though necessarily gradually), looks promising for extinguishing the electrical industry as a separate organization. It is stated that Mr. Faraday Proctor is going to give evidence for the Incorporated Municipal Electrical Association before the Departmental Committee; and he would like any special information that members think should be in his possession. Among information the Council desire to have has regard to a complaint that plant extensions by municipalities are being refused by the authorities, while power companies appear to be favoured. Gas undertakings have a still stronger case. While they are being urged to supply more and more tar, benzol, and toluol, they are held back by capital and labour restrictions—at the same time knowing that the electric power companies are receiving undue preference

Centralization and Effects.

in this matter, although many of them are shovelling bituminous coal under their boilers, so destroying the products of which the Ministry of Munitions are in urgent want. Our masters help to add, by their vagaries, to the strangeness of this much troubled world of ours.

Glasses and Injurious Rays.

The electrical people do not like one to talk much of such things as ultra-violet and infra-red rays. Notwithstanding research work, they do not (or say they do not) believe they have much actual existence in electric lights. Still the "Electrician" thinks it worth while to refer to a very useful paper by Mr. W. Coblenz, issued by the United States Bureau of Standards, describing representative groups of glasses, designed to protect the eye from ultra-violet, visible, and infra-red rays. We appropriate this information from Mr. Coblenz's paper as furnished by our contemporary: Ultra-violet rays, in excess, are known to be prejudicial to eyesight, and appear to have a chemical effect, penetrating to the deeper recesses of the eye. Infra-red rays and heat, which may also be injurious, seem to affect only the outer regions of the eye, and their influence appears to be essentially thermic. Their effect requires consideration in connection with furnace work, where they are, possibly, reponsible for cataract. The group of amber-coloured glasses is effective for the suppression of ultra-violet rays. Among the Crookes glasses, the sage green and pale blue varieties are useful as a protection against infra-red rays, and transmit a fair amount of visible light. A thin coating of gold has the same effect; but the transmission of visible light is not so good. The Crookes neutral tinted glasses enable objects to be perceived in natural colours, and have a high transmission in the visible, but are not so successful in stopping infra-red energy. Other varieties, such as the greenish brown, besides protecting the eye from ultra-violet rays, also check the infra-red rays to some extent. For furnace work, bluish green and sage green glasses, which are a protection against infra-red rays, and yet enable the workmen to see the molten surfaces, are useful. On the other hand, for working molten quartz, for search-light work, and for operating oxy-acetylene or electric welding, very dark glasses—*e.g.*, of the green and yellowish green varieties—are needed in order both to block the ultra-violet and infra-red radiations, and to protect the eye against the high visible intrinsic brightness.

PERSONAL.

Mr. R. SCOTT, the Assistant Manager at Cowdenbeath, Fife, has been appointed Manager at the works of the Kilmalcolm Gas Company.

Mr. JAMES MITCHELL, the Engineer and Manager of the Montrose Gaslight Company, has been appointed Chief Assistant to Mr. Alex. Yuill, the Engineer and Manager of the Dundee Corporation Gas Department.

Captain W. DONALD CHESHIRE, who has been presented by the King with the Albert Medal of the second class, for gallantry in saving life, is the son of Mr. William Cheshire, a Director of Messrs. Parkinson and W. & B. Cowan, Ltd.

The Board of Trade inform us that they have appointed Mr. W. J. ATKINSON BUTTERFIELD, M.A., F.I.C., Assoc. Inst. C.E., as one of the Metropolitan Gas Referees in succession to Mr. A. VERNON HARCOURT, F.R.S., who has intimated to the Board that he does not desire to accept re-appointment on the expiration of his present term of office on Sept. 1 next.

In a recent re-organization of the Ministry of Munitions Inventions Department, we learn that Mr. W. G. HEAD, of the South Metropolitan Gas Company, has been appointed Director of the Works Section. Mr. Head has been connected with the Inventions Department for several months. He was previously engaged as South-Eastern District Manager of the Metropolitan Munitions Committee.

Mr. FRANK SUTCLIFFE TOWNEND, of the Birmingham Gas Department, has gained the B.Sc. (Engineering) degree of the London University. He entered the service of the Birmingham Gas Department as junior draughtsman under Mr. J. Hewett, the Distribution Engineer, in June, 1911; and in December, 1914, he was transferred to the engineering staff at the Nechells works, where he is still engaged under Mr. E. B. Tomlinson, the Engineer. Mr. Townend also holds first class certificates in the Honours Grade in both "Gas Engineering" and "Gas Supply."

According to Reuter's New York correspondent, negotiations have virtually been completed for an amalgamation of the National Carbide Union and the Carbide and Air Reduction Companies, which are capitalized at £40,000,000. The latter concern possesses plant for extracting nitrogen and oxygen from the air.

An official list of American manufacturers of coal-tar products includes (according to the "Chemical Trade Journal") the names of 158 manufacturers in the United States producing: Coal-tar crudes, 23; intermediates, 70; artificial dyestuffs, 99; vegetable dyestuffs and extracts, 18. Then 16 firms produce 841,200 gallons of benzol, toluol, xylol, and phenol; 20 produce 6,186,000 lbs. of naphthalene, carbolic acid, &c.; 20 produce 5,821,650 lbs. of intermediates; 17 produce 1,138,100 lbs. of artificial colours; and 11 produce 6,678,500 lbs. of vegetable dyestuffs and extracts.

A FEW INTERESTING DATA CONCERNING COKE.

By GEORGE FREDERICK ZIMMER, Assoc. M. Inst. C.E.

WHEN coke is quenched in quantities of 4200 kilos. in 11 c. metres of water, 3 c. metres of the latter are evaporated with each quenching; and these 3 c. metres will have to be made up by fresh water admitted to the tank. This leaves the quenching water at a temperature of about 165° C., if the fresh water has been taken from the main. In such a quenching process, the coke is only superficially cooled—a piece the size of a fist will still be of a dark red inside. If such coke is allowed to evaporate its surplus water through the inner heat, it becomes practically dry; and the hotter the quenching water has been, the drier will be the coke. The water should enter the coke receptacle, not from all sides, as is usually the case, but merely from the bottom, as in this way only is the water forced completely through the mass of coke, which should finally contain between 7 and 8 p.ct. of moisture. The larger lumps are, however, drier than the smaller; the difference being between 1 and 2 p.ct.

According to Herr B. Ludwig, of the Munich Gas-Works, a coke-quenching plant of the above capacity will cost £2500 for fifteen ovens (each of a capacity of 6000 c. metres per day), with, together, a capacity of 90,000 c. metres. The cost of repair should be taken at 4 p.ct., which figure leaves a margin of safety. In order to draw all the fifteen ovens, seven hours were occupied by seven gas workers and seven labourers, which, apportioned per charge, worked out at 2·662d., or 0·69d. per ton. The expenses for electrical current per charge are 1·2d. per K.W.-hour, or 0·291d., KW.-hour per ton of coke. The quenching water consumption per charge is 3 c. metres, or 727 litres per ton of coke.

The breakage of coke through fall, if it contains much water, is less than for dry coke. Thus when the coke contains 13 p.ct. of moisture, it is not nearly as friable as when containing 7 to 8 p.ct. If coke with 7 to 8 p.ct. of moisture, of ¾ in. to 1½ in. size, is turned over once with a coke fork, 1 p.ct. is reduced sufficiently small to pass through a ⅜-in. mesh. If the same coke, but 2½ in. to 3 in. in size, is treated in the same way, 3 p.ct. of it will pass through a 1⅜ in. screen, and 1¼ p.ct. will pass through a ⅜ in. screen. Coke with 13 p.ct. of moisture will, in the latter case, contain 2·8 p.ct. of the larger, and 0·82 p.ct. of the smaller coke. An experiment made with coke containing 7 to 8 p.ct. of moisture gave the following results in breakage when dropped respectively 20, 40, 60, and 80 inches:

Height of Drop.	20 in.		40 in.		60 in.		80 in.	
Size of small coke after drop . .	⅜–1¼	0–⅜	⅜–1¼	0–⅜	⅜–1¼	0–⅜	⅜–1¼	0–⅜
Coke 2½ in. to 3 in. size	5·6	0·77	5·6	1·45	8·2	1·5	8·2	1·8
Coke ¾ in. to 1¼ in. size	—	0·70	—	0 80	—	1·0	—	1·2

For coke with 13 p.ct. of moisture the breakage will be 40 to 50 p.ct. less. Screened coke, 2½ in. to 3 in. in size, after being filled into sacks with a fork contains 3·3 p.ct. of small coke passing through a 1¼ in. screen; coke of ¾ in. to 1¼ in. size after treating in a similar way contains 0·77 p.ct. which passes through a ⅜ in. screen.

Grabbing dry coke of 2½ in. to 3 in. size with a 4 c. metre "Hone" single-chain grab caused a breakage of 10·5 p.ct. of ⅜-in. to 1¼ in. size, and 3·46 p.ct. which would pass a ⅜-in. screen. When small coke of ¾ in. to 1¼ in. was grabbed in the same way, it afterwards contained 2·35 p.ct. of coke passing through a ⅜-in. screen. These figures include the "small" produced by the grab, and the material both in the grab and that left by the grab. It is, therefore, a record of the total breakage caused.

Coal Factors' Profits.

The negotiations (says the "Iron and Coal Trades Review") between the inland coal factors and wholesale merchants on the one hand and the Coal Controller on the other, regarding the prices to which the traders are entitled during the war, are still in progress. At the moment, the main features of the terms under consideration include the following maximum margins over and above the delivered cost: (1) Locomotive railway coal for steam-raising, 3d. (2) Railway coal for other purposes, 6d. (3) Supplies for national factories, 6d. (4) Supplies for gas and electric undertakings, 9d. (5) Supplies of house coal to retail merchants for distribution, 1s. (6) Other coal purchased in lots of 10,000 tons or more, 1s. (7) All other coal (according to quantity), 1s. 6d. to 2s. This is regarded as a very unsatisfactory and unfair scale in many respects—from the factors' point of view, seeing that, apart from the cost of transport, it is to include all office and other expenses, which alone are more than sufficient to absorb the smaller allowances in the majority of cases, and that where the coal passes through the hands of more than one factor or merchant before reaching the consumer or retailer, the amounts in question are to be divisible between them. Our contemporary adds: "It is fully expected, therefore, that these terms will undergo important revisions before a final settlement is arrived at."

THE "DIRECT" PROCESS FOR THE MANUFACTURE OF SULPHATE OF AMMONIA.

From the Annual Report of Mr. W. S. Curphey, the Chief Alkali Inspector.

To-day another portion is published of the statement [*ante*, p. 281] by Mr, W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, 1906, in his report for 1916, regarding the further study during the past year of the "Direct" process for sulphate making in gas-works.

Working Temperature of Purifiers.

Experience shows that temperature readings taken by means of thermometers inserted at various points in the gas-mains afford a very imperfect guide for the control of purifier working when the system is exposed to the weather. Not only do the boxes differ in temperature one from another, and one grid from its neighbours, but extensive cooling takes place at the lids and sides of the boxes and in the mains themselves, and in some works further disturbance is caused by the neighbourhood of steam-pipes. It was therefore arranged to take daily readings of the temperature of the oxide itself by means of thermometers attached to metal rods sliding in fixed tubes. Suitable tubes (¾-in. diameter) were first of all inserted through the sides of the boxes. But they were difficult of access in this position; and it was subsequently found better to arrange the tubes vertically, each with its upper end attached to the central fixed plate in the purifier cover, and its lower end resting on one of three grids and embedded in the oxide. The thermometer carriers were lowered until the pointed end of the carrier enclosing the bulb entered the oxide, and the tops of the fixed tubes were then closed with screw caps to prevent the escape of gas. With thermometers so arranged, readings have been taken by one of the works staff at a fixed hour each day, and the results co-ordinated and recorded in graphical form.

Interpretation of the results is not easy. The temperature of the oxide on the bottom layer is in part governed by the steam-pipe placed below the bottom grid. The excess temperature in that layer over that of the entering gas does not, therefore, afford an exact indication as to the intensity of the chemical reactions that take place in the oxide. The rise of temperature of the middle layer, on the other hand, is not subject to the same disturbance, and affords a better indication of the progress of purification. The top layer of oxide is also unaffected by steam. But here the cooling effect of air on the sides of the box is powerfully reinforced by that of the lid; and a fall of temperature is generally noticeable in the top layer. Moreover, moisture condensed on the purifier lid, and dropping back on to the oxide, may well reduce its temperature. It is not an uncommon thing to see water lying on the top layer of oxide when the boxes are opened in the "Direct" process, and the oxide in contact with the sides of the boxes is often noticeably wet.

Special importance, therefore, is attached to the temperature of the middle layer, and in graphs prepared a curve was added, the ordinates of which correspond to the excess temperature of the middle over that of the bottom layer from day to day. Taking the various experiments in order.

Experiment No. III.—(Table B.) *Purifier Lids Unprotected by Covers:*

First purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	+ 8° C.
Average change of temperature—middle layer	+ 7° C.
Average change of temperature—top layer	−0·5° C.

Differential curve.—Middle layer is steadily active throughout.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 2° C.
Average change of temperature—top layer	− 1·5° C.

Differential curve.—Middle layer begins to act on the ninth day.

Experiment No. VII.—(Table B). *Purifier Lids Lagged and Covered:*

First purifier: Direct temperature readings:—

Average change of temperature—bottom layer (includes steam)	+ 12·5° C.
Average change of temperature—middle layer	+ 6° C.
Average change of temperature—top layer	− 5° C.

Differential curve.—Middle layer becomes markedly more active on the eleventh day.

The temperature of the bottom layer in its rise and fall seems to show general correspondence with that of the inlet gas, but very little with the curve showing the make of gas. Rate of flow seems to have little effect on temperature.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 8° C.
Average change of temperature—top layer	− 3·5° C.

Differential curve.—Middle layer becomes active on the third day; its activity markedly increases on the thirteenth day.

The temperature curves given in the graphs above referred to all relate to normal conditions of work (gas passed 12·1 to 19·3 million c.ft.); the graphs referred to later relate to a period of disorganization (5·1 million c.ft., Experiment VI., Table A). The same oxide was used in all cases—a mixture of two-thirds fresh bog ore with one-third old spent oxide (55 p.ct. sulphur, dry basis).

Experiment No. VI.—(Table A). *Purifier Lids Unprotected.*

First purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	+ 10° C.
Average change of temperature—middle layer	+ 5·5° C.
Average change of temperature—top layer	− 6° C.

Differential curve.—Middle curve is active throughout. A marked increase of activity is noticeable on fourth day.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 0·5° C.
Average change of temperature—top layer	− 2° C.

Differential curve.—Middle layer begins to operate on the second day.

The question arises, Is any guidance afforded as to the progress of purification by graphical records such as those cited above? Do they enable one to anticipate periods of disorganization? So far as present experience goes, the results appear to be of quite a negative character. Undoubtedly, rise of temperature favours purification; but a suitable temperature by itself is insufficient to secure regularity of working. Indeed, in every case, good and bad, the oxide was maintained at the desired temperature by means of steam. Other factors clearly operate, as pointed out in the report for 1915. Moisture, rate of flow, ammonia and oxygen content of gas, absence of soluble salts of iron, and the proportion of sulphuretted hydrogen itself—all these are important factors, and, in addition, the physical character of the oxide (apart from humidity) has to be taken into account.

An attempt has been made in the two tables that follow to co-ordinate the data relating to periods of good and bad working, in the hope that guidance may be afforded thereby for the conduct of operations elsewhere. Analysis of the data yields results of positive value. It would appear:

First.—That in every case failure of the purifiers occurred when the make of gas was on the increase—at the end of the period.

Secondly.—That the use of fresh and highly moist oxide is attended with risk when it coincides with periods of maximum make of gas; and an exceptional amount of ammonia is needed at such times to maintain the oxide in a neutral condition. It is confidently believed that when the oxide has become drier and is better matured, results will show improvement. Fresh oxide should be stocked and brought into condition during the summer months.

Supply of Ammonia to the Purifiers.

The best method of controlling the supply of ammonia to the purifiers in the "direct" process has been the subject of special inquiry at "Works E," as elsewhere. At "E," there is no rotary washer, and reliance has had to be placed on a bye-pass. A 2-in. bye-pass was first provided from the inlet to the outlet of the bubbler. At a later date, it was decided to try the effect of admitting ammonia to the second purifier as well as to the first, and a second 2 in. bye-pass was added from the gas-main entering the bubbler direct to the purifiers, with branch pipes admitting gas to the bottom and top of the first purifier, in the expectation that sufficient ammonia would thus be made available in the lower layers of the second purifier to neutralize any soluble salts of iron that might be formed there. In addition to these two pipes, the whole of the crude gas has been bye-passed from one to three hours a day during the winter months to activate the highly moist bog ore that had to be charged. Recently [in February, 1917] a further change has been made. The second 2-in. bye-pass has been connected direct to the ammonia pipe from the virgin liquor still to obtain a supply of strong gas for emergency use in the second purifier. Exact control of ammonia in the "direct" process is always a matter of difficulty. The ammonia content in the crude gas entering the bubbler is governed by the volume and temperature of the virgin liquor that separates in the hydraulic main and condensers, and when a long main is in use between the bubbler and purifier, as at "Works E," condensation, accompanied by absorption of ammonia, takes place to a very notable extent. Thus, from the 100 yards of main at "Works E" no less than 40 gallons of weak liquor are pumped per day (with about ·60 of "free" and ·46 of "fixed" ammonia per 100 parts, equal to about 5 grains of ammonia per 100 c.ft. of gas) when the two stills are at work, and 10 gallons when they are idle. A rotary or other form of washer is also subject to disturbance as the vapour tension of ammoniacal liquor varies with the temperature: Thus, coal gas leaving a coke scrubber fed with gas liquor, containing 1·95 parts of "free" ammonia per 100 parts, at 12° C. (53° Fahr.) contained 18 grains of ammonia per 100 c.ft. of coal gas; at 8·5° C.

(47° Fahr.) it contained 6·5 grains of ammonia per 100 c.ft. of coal gas.

Control by test, therefore, is the only satisfactory procedure; and for this end a number of aspiration experiments were made to ascertain the amount of ammonia actually entering the purifiers with the various bye-pass taps under control.

TABLE A.—CONDITION OF PURIFIERS DURING PERIODS OF DISORGANIZATION.

—	Experiment No. I.	Experiment No. II.	Experiment No. VI.
Period	Oct. 24/16 to Oct. 31/16	Oct. 31/16 to Nov. 8/16.	Jan. 15/17 to Jan. 24/17.
Number of days	7	8	9
Gas passed:			
Millions of cubic feet	3·6	4·0	5·1
Rate per 24 hours, c.ft.:			
Whole period	518,000	540,000	565,000
At end of period	536,000	560,000	630,000
Average gas passed per sq. ft. superficies per 24 hours	890	930	970
Steam below bottom grids	All boxes	All boxes.	All boxes.
Ammonia bye-passed			
2-in. bye-pass inlet to exit bubbler	Open	Open.	Open.
2-in. bye-pass to second purifier	—	—	Open.
All gas bye-passed	—	1 hour per day.	1 hour per day.
Oxide of iron as charged to			
First purifier	New bog ore.	New bog ore.	⅔ new; ⅓ old.
Second purifier	New bog ore.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Fouled oxide:			
Character	Neutral.	Neutral.	Neutral.
Soluble iron	Trace on one grid.	Present on two grids.	Present on all grids.
Temperature:			
Coal gas entering °C.	17 } 5°C.	18 } 4·5°C.	14 } 7°C.
,, ,, leaving °C.	12 }	13·5 }	7 }
First purifier—average, all grids:			
Whole period °C.	27	34	25·5
At finish °C.	23	32	25·5
Second purifier—average, all grids:			
Whole period °C.	30	27	25·5
At finish °C.	32	27	29
Fourth purifier—top layer °C.	18·5	16·5	14
Excess temperature of middle over bottom layer—Average °C.:			
First purifier	+ 5·5	—	+ 5·5
Second purifier	—	+ 1	+ 0·5

TABLE B.—CONDITION OF PURIFIERS DURING NORMAL PERIODS OF WORKING.

—	Experiment No. III.	Experiment No. IV.	Experiment No. V.	Experiment No. VII.
Period	Nov. 8/16 to Nov. 30/16	Nov. 30/16 to Dec. 21/16	Dec. 21/16 to Jan. 15/17	Jan. 24/17 to Feb. 27/17.
Number of days	22	21	25	34
Gas passed:				
Millions of cubic feet	12·1	12·2	15·3	19·3
Rate per 24 hrs., c.ft.:				
Whole period	551,000	580,000	612,000	568,000
At end of period	577,000	653,000	640,000	600,000
Average gas passed per sq. ft superficies per 24 hours.	950	1000	1050	980
Steam below bottom grids	All boxes	All boxes	All boxes	All boxes
Ammonia bye-passed:				
2 in. bye-pass to main	Open	Open	Open	Open
2 in. bye-pass to second purifier	—	Open	Open	Open
All gas bye-passed	1 hr. each day.	1 hr. per day.	1 hr. per day,	2 hrs. to Feb. 10; then 3 hrs. per day.
Oxide of iron as charged:				
First purifier	⅔ new bog; ⅓ old oxide	⅔ new; ⅓ old.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Second purifier	⅔ new bog; ⅓ old oxide	⅔ new; ⅓ old.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Fouled oxide:				
Character	Alkaline, one grid.	Neutral	Alkaline, two grids.	Alkaline, three grids
Soluble iron	Trace on two grids.	Trace on one grid.	Absent	Absent
Average moisture (all grids), p.ct.	30·9	16·2	7·7	22·0
Temperature:				
Coal gas entering °C.	15·5 } 2°C.	13 } 3°C.	14·5 } 4°C.	14·5 } 1°C.
,, ,, leaving °C.	13·5 }	10 }	10·5 }	15·5 }
First purifier—average, all grids:				
Whole period °C.	28	30	30	29
At finish °C.	23·5	27	24·5	33
Second purifier:				
Whole period °C.	25	25·5	29·5	31
At finish °C.	30	24	25·5	33
Fourth purifier—top layer—°C.	15·5	13	14	21
Excess temperature of middle over bottom layer—average °C.:				
First purifier	+ 7	+11	+9·5	+6
Second purifier	+ 2	Nil	—2	+8

First test, Oct. 11, 1916:

2-in. bye-pass from inlet to outlet of bubbler—half open.
Virgin liquor still working; cyanide still idle.
Temperature of coal gas leaving "bubbler," 36° C.
,, ,, ,, entering first purifier, 20° C.

Ammonia—Grains per 100 C.Ft. of Gas.

By aspiration test:

At exit from bubbler, and before admission of bye-pass	9
At inlet to purifier after admission of bye-passed crude gas and passage through main (100 yards)	9

Hence, the added crude gas exactly compensates for the 5 to 6 grains of ammonia removed by condensation in the main.

Second test, Oct. 17, 1916:

2-in. bye-pass open as above.
Virgin liquor and cyanide stills both working.

Ammonia—Grains per 100 C.Ft. of Gas.

Coal gas leaving bubbler, 12 to 1 p.m., 22° C.	2·3
,, ,, ,, 2 to 3 ,, 40° C.	2·3
Coal gas entering purifier, 3.30 to 4.30 p.m., 17° C.	6·7

In this case the added crude gas more than made up for the ammonia removed by condensation.

Third test, Oct. 26, 1916:

2-in. bye-pass, above named, closed: V/l still alone working.
2-in. bye-pass from inlet bubbler to purifiers, full open.
(*a*) Branch pipe to gas-main entering bottom of the first purifier.
(*b*) Branch pipe to gas-main entering side of first purifier close to lid.

Ammonia—Grains per 100 C.Ft. of Gas.

By aspiration test:

Gas entering bottom of first purifier— Cock (*a*) three-quarters open ,, (*b*) half open	4·2
Both cocks shut	1·7

Hence, the crude gas bye-passed through the cock (*a*), three-quarters open, adds about 2½ grains of ammonia (per 100 c.ft.) to the inlet gas. The amount entering the top side of the first purifier through the cock (*b*), half open, is here unknown.

Fourth test, Oct. 30, 1916:

2-in. bye-pass, above named, closed.
2-in. bye-pass from inlet of bubbler to purifiers, full open.
(*a*) (*b*) Branch pipes in use as above.

Virgin liquor and cyanide stills both at work; water on Liebig increased.

Ammonia—Grains per 100 C.Ft. of Gas.

By aspiration test:

Gas entering bottom of first purifier— Cock (*a*) open; cock (*b*) closed	3·8
Cock (*a*) open; cock (*b*) open	2·8

Hence cock (*b*) admits about a grain of ammonia per 100 c.ft. of gas to the top of the first purifier, when cock (*a*) is fully open. This amount of ammonia, though doubtless sufficient for summer periods of working, is wholly insufficient when purifiers are pressed in the winter; and on occasions, as above stated, the whole of the crude gas has had to be bye-passed for a limited period each day. The effect of bye-passing a small volume of strong ammonia gas from the still has yet to be determined.

Losses of Ammonia.

The most serious sources of loss undoubtedly occur at the still and at the bubbler, when crude gas is bye-passed in any quantity. Loss at the still, as already stated, is mainly due to deficiency of lime. The following tests are representative of the results obtained at these works:

—	Ammonia, per 100 Parts of Spent Liquor.			Calculated Loss of S/A. Lbs. per Ton of Coal.
	Free.	Fixed.	Total.	
1.—(*a*) Lime feed defective	·007	·653	·660	5·0
(*b*) ,, ,, ,,	·009	·440	·449	3·0
(*c*) Better feed; reduced flow of liquor	·030	·005	·035	0·3
2.—Lime feed repaired	·0025	·0003	·0028	0·02

The loss due to bye-passing of gas is more difficult to control, and in the winter months, with wet fresh ore in use, must be serious. Thirteen grains of ammonia per 100 c.ft. of gas correspond to about 1 lb. of sulphate of ammonia per ton of coal carbonized. In the summer months 2 to 3 grains of ammonia appear to be ample. In the winter months hitherto, 15 to 20 grains of ammonia have been required.

The loss at the still is clearly preventible, if suitable qualitative tests are regularly applied, as they should be. The loss at the purifiers is in part preventible, and would be greatly reduced were it possible to maintain the oxide in a fit condition. It would be of assistance, were it possible, to admit ammonia separately to the

various layers and devise a simple qualitative test to determine the condition of the oxide from day to day. The matter is now engaging attention. It may prove possible to sample the gas at various points in the purifier and note the effect on turmeric or litmus paper, or to combine a temperature and sulphiding test in such a way that small test samples of the oxide are allowed to remain in contact with the gas at various levels—the samples being withdrawn for examination from time to time.

(To be concluded.)

GERMAN GAS ASSOCIATION—PRESIDENTIAL ADDRESS.

(Concluded from p. 274.)

Quality of the Coal Supplies.

In the conditions prevailing, it is little wonder that consideration of the quality and price of the coal supplied has taken a back place. Gas-works were glad to get the coal, and made small complaint that frequently it had little in common with gas coal. War is a hard task master, and, in this time of shadow, working results have fallen off—smaller makes, a reduced yield of coke, poorer gas, &c., have been the rule. Interruptions of the coal supply, and consequent limitation of gas consumption, together with the inferior quality of the coal, have had a damaging effect on the gas-coke market. The export trade in coke has been interfered with. There were many attendant evils. Owing to its bad quality, more coal had to be carbonized and more settings kept in action; there was greater wear and tear on the apparatus; good coke for heating the retort-settings was not available, neither was good lubricating material for conveyors, &c. Last year some of these points were mentioned; but, contrary to our hopes, things have gone from bad to worse.

As to price, long consultations resulted in an increase of 2s. a ton being conceded to the coal factors on Jan. 1 last. The Association endeavoured to ward off the impending evil, and, in conjunction with the German Municipal Conference, presented a petition to the Prussian Minister of Commerce and Industry begging that fresh heavy financial burdens should not be imposed on gas-works, as they would involve a reduction in output, which was an event directly opposed to the interests of the community as well as of the conduct of the war. The remonstrances of representatives of consumers have, however, been in vain. A second increase of 2s. per ton came into force on May 1, quite unexpectedly and so suddenly that there was no opportunity of opposing it.

Increase in Gas Consumption.

The output of gas in the year 1916-17 still shows an increase over the preceding year and the pre-war period, though from the middle of December last it has been unfavourably affected by the compulsory limitation of consumption. How great has been the effect of this may be realized from the following figures for the output of gas in Lubeck, which are typical of other places also: In January to April, 1916, there was an average increase of 25·3 p.ct. over the preceding year. In May to September, 1916, the increase was 15·9 p.ct.—the effect of the introduction of "Summer Time" being here noticeable. In October to December, 1916, the increase averaged 15·1 p.ct.; while in January to March, 1917, it was only 6·3 p.ct.

Labour.

The question of *personnel* has occupied us very much during the past year. It assumed a more serious character as days went by, and all serviceable hands were relentlessly taken for military service. Feeble old age and untrained youth are inefficient substitutes, and our works have now to be content with the not exactly lovely, if interesting, motley mixture of soldiers, prisoners of war, Belgian civilians, and other types of people, or ultimately with the "eternal feminine." We have to carry on with these, not of our own accord—for that has ceased to be—but merely to meet the pressing needs of the time.

So far as the supply of fitters is concerned, the courses of instruction at various centres have been useful, and have helped to fill many gaps. For instance, the courses at Dantzig give qualifying instruction for plumbers, smiths, and brass-fitters, while there is a secondary school training in gas and water fitting for men invalided out of the army, and courses for prisoners of war, arranged by Professor Bunte in collaboration with the Baden Agricultural Department. At the instance of Herr Reinhard, of Leipsic, the Association presented a petition to the War Labour Department of the Ministry of War, asking for a supply of suitable labour for the retort-houses. The following reply has been received: "As the Acting District Commanders have been already reminded by special instruction that gas and water works are to receive every consideration in regard to labour, it is considered unnecessary to make any further general order. In particular cases of pressing need, whether for officials or men, immediate application should be made to the District Commander; and if this proves unavailing, a request should, if necessary, be directed to the War Labour Department."

Effect of the War on the Price of Gas.

Last year it was pointed out that an effect of the war would be an almost universal increase in the price of gas. This is due to war influences that are constantly becoming more tangible—such as the difficulties and expense of coal supply, the sequestration of stocks and materials, and the rise in wages and prices of materials. While formerly, however, it was merely a rise of a few pence per 1000 c.ft. in order to keep the gas-works on something like the same basis as in peace time, and to meet the considerably increased expenses, now totally different influences are coming into play. Instead of a small demand—made, indeed, unwillingly—there are now an imperative order and compulsory measures of a most incisive and disagreeable kind. Any reasonable tariff is scoffed at, and gas-works are compelled to make gas so dear that a considerable falling off in its consumption is inevitable. The measures vary; but one or two examples may be cited. At Crefeld, the charge for any gas consumed in either November, December, or January which is in excess of the consumption in October is 17s. per 1000 c.ft. At Nauheim Bad, the ordinary charge is 4s. 6d. per 1000 c.ft.; but for any quantity in excess of three-fourths of the quantity consumed in the same period of the preceding year, £1 8s. 4d. per 1000 c.ft. is charged.

In view of these far-reaching changes and impending burdens, it is a vital question what is to be done to balance their ill-effects and ensure the commercial or industrial success of gas-works in future. There are certainly limits to increases in the price of gas or in receipts from residuals; and to reductions of working expenses, and other sources of equalization, economy must be looked for. One that appeals especially to me has been indicated by Herr Schäfer, of Dessau, in an article in "Wasser und Gas," in which he advocates the co-operation of adjacent gas-works in order to avoid energy being frittered away to the disadvantage of gas supply as a whole.

Gas and Water Department.

Obviously wisdom dictates sensible economy of materials, and new construction should be undertaken only where its necessity, purpose, and economy are patent. Such considerations have led to the establishment of a "Gas Department," recently enlarged to a "Gas and Water Department." Started, at the instance of the Building Revision Department, by the War Office, it is intended to be a technical consultative office, with the following objects: (1) The support of measures for maintaining the productive capacity of existing plant; (2) co-operation for the purpose of supplying gas, by extensions, new construction, joint working, &c.; (3) revision of plans for construction and extensions; and (4) furnishing technical information on other services competing with public gas-works.

This is yet another department in a time of over-organization; but, nevertheless, it must be hoped that its work will prove of value to all.

Taxation.

Unfortunately, necessity has compelled new ideas of taxation to be accepted; and it was not surprising that coal, notwithstanding its considerable price, has been marked down for a heavy tax. The coal-tax, which has been adopted by the Imperial Parliament, amounts to 20 p.ct. of the selling price of the coal at the pit head. It was impossible to oppose the tax successfully. The Empire wants money, which everyone must help to provide. We must all be content, therefore, to settle lines for its proper incidence, and to keep in touch with the Imperial Treasury in regard thereto. The Treasury, after prolonged consideration, adopted the following basis of working—viz.: "With gas-works and coke-oven works the burden imposed by the tax is to be placed on gas and coke in the ratio of the proceeds from the sale of the gas and coke disposed of by the gas or coke works." This plan did not tally fully with the views of the Special Committee, which was of opinion that ordinary gas-works should pass the tax wholly on to the chief product—viz., gas—and leave untouched by it the bye-products which are dependent on the state of the market. Also that coke-oven gas supplied to gas-works, being a bye-product of the coke-works, should not be increased in price on account of the tax. Coke-oven works should shift the burden of the tax on to the coke delivered by them. It transpired, however, that the Treasury would not adopt any formula of this kind either in the decree itself or in the regulations for applying it. Consequently, it was necessary for us to restrict our efforts to obtaining simplicity and uniformity in the procedure for settling the incidence of the tax. A petition has been presented to the Federal Council asking that there should be only the following Courts of Arbitration in the matter—one for gas-works making their own coal gas, one for gas-works which receive coke-oven gas, and one for water-works. The request was also made that the Courts should be composed of technical men nominated by our Association. In order that the proper incidence of the tax may be well thrashed out, suggestions are invited by the Council of the Association.

The traffic tax also has been imposed; but gas-works are not directly affected by it, as an increase in the loading allowance takes away its effect.

Taxation is a ticklish matter; and neither the Association nor its Taxation Committee must be blamed if the gas industry becomes more deeply affected by it than at present. The Committee have carefully followed the trend of events, and are ready for all eventualities. They are keeping in touch with the corresponding Committee of the Union of Electricity Works, as it is most desirable that the representatives of both forms of energy—gas and electricity—should unite, both for the sake

of strength and to direct any taxation on right lines equally for both as far as may be.

Organization and Representation of the Industry.

The important questions of economies of working of gas undertakings which the war has raised have directed attention to the organization of the industry. Naturally, there has been some overlapping of the activities of the German Association of Gas and Water Engineers and those of younger bodies, such as the Central Gas Bureau, the Commercial Union of German Gas-Works, &c. But the more important and essential it is to have a good organization, the more difficult is it to solve the question of securing it. In no sphere is greater care requisite in order to avoid errors being made and decisions arrived at the consequences of which it will be difficult subsequently to make good.

The Council of the Association have for a long time past discussed this question of organization. The only positive result so far has been that three members—Herren Körting and Lempelius, for the gas industry, and Herr Kummel for water supply—have been entrusted with the representation of the Association's interests in the capital of the empire in all matters requiring urgent decisions during the war. This delegation of powers was absolutely essential at the present time. The authority of the three members is limited to matters of extreme urgency, and they are to act in the closest possible concert with the Council and President of the Association. Of another aspect of the matter, there is no doubt that after the war a thorough revision will be necessary on such questions as the location and duties of the Technical General Secretary of the Association, who should preferably be in Berlin (instead of at Carlsruhe, as at present) as the centre of its activities, the office of the "Journal für Gasbeleuchtung" (now edited at Carlsruhe and published at Munich), the location of the Association's Instructional and Experimental Works, and the relations of the Association with the colleges, especially that at Charlottenburg. Efforts, moreover, have been made recently to clearly define the relationships of the various technical gas institutions, and to lay down more clearly their respective spheres of activity. An article published towards the close of last year proposed that these spheres should be defined as follows—viz.: The German Association of Gas and Water Engineers should have purely technical-scientific aims; the Commercial Union of German Gas-Works should concern itself with purely industrial matters and trade in bye-products; while the Central Bureau for Gas Propaganda should represent the interests of the gas industry as a whole, and maintain relations with the authorities throughout Germany.

The writer of the article contended that the proposed division of work was supported by the statutes of the three bodies. While the advantage of clear distinction of their functions cannot be overrated, it is nevertheless questionable whether the Statutes of the Association at least are in keeping with the limitation suggested. It is doubtful if the Association could unreservedly hand over to another body the study of practical questions in the gas industry, which it has hitherto carried on. Anyhow, the question must be examined thoroughly in order to see that the position of the Association as the fully representative body of the gas industry is not wrongfully challenged. In order to be prepared for dealing with this question, the Council have appointed a Committee, chiefly composed of past members of Council, to consider it without bias, and to report what organization will best meet the future needs of the German gas industry.

The Gas Industry Outside Germany.

The ill-effects of the war on the gas industry have been more marked abroad, especially in the countries at war with Germany, than at home. A deplorable state of things prevails in countries dependent on English export of coal. Want of ships' space, the enormous rise in the price of coal, and high freights have made their supply almost impossible. Italy and France have been badly hit—especially Venice, Genoa, and Milan. Sometimes any gas consumption has been prohibited, sometimes the price of gas has been increased sevenfold, sometimes the works have made a considerable loss. You know our chief enemy—England—has suffered under deprivations, shortage of material, high prices, and serious wage struggles. The proud Briton sees things developing badly for him; and the knowledge is dawning gradually on him that war is not always a magnificent business. The Germans await the end tranquilly—our submarines are at work. They will attain their object, in which we descry a just retribution. This is not the place to say more. We will not emulate the English technical men, who prefaced the retrospect on the year 1916, in the English "Journal," with political reflections which had nothing to do with our industry, but which, as a contributor to the German Journal observed, bore testimony to their one-sided and strong feeling of self-righteousness and real English hypocrisy. In it Germans were reproached invidiously for placing might before right, displaying cowardice and treachery, and committing every kind of atrocity; the "ludicrous" peace offer of the German Empire was branded as fantastic stage-play, and covered with scorn and derision; and the exploits of our submarines and air-ships were designated as murder and manslaughter—as the work of barbarians before whom the civilized world shuddered with loathing. Enough! we will not follow the English technical men in this course; it is not the German way. But it is not uninteresting, as a study of national psychology, to observe the effect of the sickness with which the whole world is seized, on those whom we once called friends, and to see how the outlook for mutual human work of culture is dimmed and how racial hatred blinds to all and every reason.

The journal "Chemische Industrie" gathers from papers on England's Commercial War that, according to the English, French, and American Technical Press, the reason of the German superiority in almost all branches of industry is to be found not merely in organization, but in extraordinarily close relations between scientific investigation and technology. We have every reason to rejoice at this correlation. Prof. H. Bunte, our Nestor and scientific leader for many years past, said a year ago that the chemical industry founded on tar showed a double face—one turned towards peace, the other towards war—but that the object of war was peace. Our industry is based on getting the most out of coal, and we may confidently expect that knowledge and experience acquired in the hard times of war will bear rich fruit in peace. I conclude by wishing that this peace, for humanity's sake, may soon come, and that the gas and water industries may be found ready for the great problems that will await them.

INCREASING THE INTERNAL AIR-SUPPLY TO INVERTED GAS-FLAMES.

Alexander's Method.

At the seat of the bunsen flame is the blue or greenish looking inner cone which is the commencing point of combustion so far as the amount of air admitted with the gas will allow. The outer cone is the part where the half-burned gases are more or less completely burned in the outside air—the degree of complete combustion depending upon various factors, such as the pressure and composition of the gas, the amount of air drawn in in relation to the requirements of the gas, the degree of perfection of admixture, and so forth. The progressive character of the combustion from the inner cone to the outside of the flame is disclosed by the experimental temperature measurements that have been made, which indicate that there are great temperature variations relative to the structure of the flame within (as Prof. Arthur Smithells has shown) very small distances.

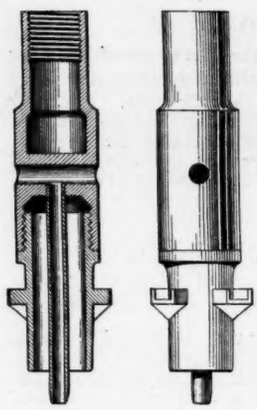
Through the burner itself, the amount of air sucked in has relation to the pressure of the gas; and the greater the pressure, the greater the resistance to firing-back with an increase in the proportion of the air to the gas consumed, but which proportion must be such that the oxygen and the accelerated combustion are equal to overcoming the cooling effect of the nitrogen introduced with the increased quantity of air. Now these various elementary facts show that, with the ordinary incandescent burner, sufficient air is not brought into admixture with the gas without a secondary supply outside the flame to complete combustion, but that, providing the pressure is sufficient to prevent lighting-back, a larger proportion of the air necessary for complete combustion can be introduced into the mixture. The question arises whether there are not means of admitting a larger supply of air, and so primarily better aërating the flame to secure perfect combustion, without setting-up conditions that will cause lighting-back. Various expedients have been put forward—such as multiple cone burners with the air taken in in stages. Even then it was found that in the burner-tube there was not perfect admixture throughout the stream of gas. At the outer part of the stream, there was a larger proportion of air than in the inner part. To change this condition, it will be remembered, burners at one time put in an appearance which employed midget fans for creating perfect admixture. But these increased the cost of the burners, and were constantly going wrong through the effect of the heat upon the lightly made moving part. Now we have introduced to notice a new patented proposal by Mr. C. J. Alexander, of No. 53, Albany Street, N.W., by which he introduces a secondary supply of heated air, independent of that which forms the mixture in the tube, right to the inner surface of the inner cone of the flame—the invention, which is simplicity itself, being specially applicable to inverted burners.

Before, however, further referring to the invention, there is a pertinent, but we are afraid almost forgotten, passage in the lecture which (the late) Prof. Vivian B. Lewes delivered before the Institution of Gas Engineers in 1897, and which may be conveniently brought to light again in this connection. He said:

> The bunsen flame gets from the mixture only roughly one-half the air necessary for its complete combustion—the other portion being obtained from the exterior of the flame during combustion. It is this burning of the gas constituents in two stages that gives the dual character to the flame; the inner cone being due to incomplete combustion at the expense of the previously admixed air, while the outer cone is formed by the combustion of the products of combustion from the inner cone at the expense of the oxygen from the outer air. . . . One of the greatest mistakes which have been made with regard to mantle burners, is that the flame with the mantle has been considered as being the same as the flame without the mantle. A moment of consideration will show the fallacy of this. If a burner be arranged so as to give a satisfactory flame, the combustion will be carried on at the expense of about three-fifths of the total air required, which had been previously mixed with the gas, while at least two-fifths more have to be obtained from the air; and when the flame is burning unchecked, and without a mantle, it obtains

this without any trouble. On placing the mantle over the flame, however, the fine network gets rapidly heated to a high temperature, and the condition of the flame will be entirely altered—the inner zone of combustion, at the expense of the previously admixed air, continuing as before, while the products of this incomplete combustion have to find their way through the meshes of the mantle and burn upon its surface as the hot mantle will prevent the diffusion inwards of the necessary air to complete the combustion below its surface. In order, therefore, to obtain the necessary conditions for a good burner for this purpose, it is necessary to obtain a mixture richer in air before combustion than with the ordinary burner; and, though this is easy to obtain when the gas is under high pressure, the problem offers considerable difficulties when there is only the ordinary town pressure to deal with.

This question of increasing the air supply to the interior of the flame itself, without promoting firing-back of the flame, is therefore one that merits consideration. Mr. Alexander claims that he has succeeded, and, as we have said, by very simple means indeed. The accompanying illustration, showing a section of an inverted burner tube, plainly indicates how he obtains the auxiliary air supply to the interior surface of the hollow inner cone of the flame without setting-up a firing-back condition. Across the burner tube is a small bar through which is a circular channel, opening to the outer air on opposite sides of the tube. From this channel depends a tube centrally placed in the burner tube; and thus—quite independently of the mixture of gas and air in the burner tube itself—the pulling action of the flame draws in a secondary supply of air which is delivered (as said) to the interior surface of the inner cone. Thus the gas and air mixture is delivered to the point of combustion through the annular space formed by the outer and the interior tubes. The obstruction to the stream of mixture has the effect of preventing its inner part being richer in gas than the outer part, and the outer part richer in air than the inner part—in this way promoting more complete mixing. At the same time, the air in the inner tube becomes heated before delivery to the inner cone. There is one point which may be suggested to the inventor; and it is that he should ensure that the inlets to this secondary air supply are carried well out of the path of the uprising products of combustion, so that no part of the spent products of combustion vitiates the air supply drawn in and delivered to the flame. [Since this was written, Mr. Alexander states that he has tested the present position of the air-inlets and the idea of taking them farther afield, and he finds no difference in the flame. Apparently therefore, chemically and thermally, there is no ill-effect.]



With the burner (which the inventor calls the "Oriole") no gas adjustment is found necessary beyond that provided by the tap; and when the tap is turned so that there is no flame noise, the point of maximum intensity is obtained at the mantle. We have witnessed the burner in use—in the large size. The flame itself seen without the mantle points to a highly intense combustion; and by it the mantle is made perfectly and uniformly incandescent in every part. Beyond this we cannot go, as there are not yet available photometrical tests backed by an authority recognized in the gas industry. But what the inventor has aimed at has been to secure perfect combustion, so avoiding the drawbacks of imperfect combustion, a burner which will appeal to the general public for cheapness and simplicity, and one which on a low gas consumption will maintain a high lighting power. The war has stopped the placing of the new burner on the market. With the difficulties with metal supplies, and the commandeering of works and machinery, no one will look at the question of the manufacture of new designs unless they have to do with munitions of war. So with this introduction, we must leave the new burner, await its development in small, medium, and large size, and the proof (by the aid of the photometer, and daily experience) of the higher working efficiency.

Briquettes in the United States.—The output of fuel briquettes in the United States in 1916, according to statistics issued by the Bureau of Mines, was 295,155 net tons, which was an increase of 73,618 tons over 1915, and constituted the greatest production on record. The large increase is attributed both to the improvement in trade conditions arising from the unusual demand for coal, and to the greater appreciation on the part of users of the value of briquettes for household fuel. Improvements have, during the last two years, been made in the process of manufacturing; and the product from many of the plants is said now to give off less of the heavy, tarry smoke to which objection has been taken in the past. Though this improvement appears to have been largely accomplished by the use of asphaltic pitch as a binder, it is pointed out that this advantage possessed by asphaltic pitch may in the long run be off-set by other advantages of coal-tar pitch—such as lower cost, ease of manipulation, and stronger briquettes.

PRIMARY VOLATILE PRODUCTS OF COAL CARBONIZATION.

U.S.A. Bureau of Mines Bulletin.

THERE has just been issued by the United States Bureau of Mines one of their "Technical Papers" (No. 140), dealing with "The Primary Volatile Products of the Carbonization of Coal." It was written by Messrs. Guy B. Taylor and Horace C. Porter, and is a sequel to Bulletin No. 1. It is very timely, says "Gas Record" [Chicago], in that in the past three years attention has been directed to the volatile products of American coal in a way not heretofore considered attractive in a commercial sense.

The pamphlet consists of 44 pages of matter descriptive of experiments on Pittsburg, New River, Illinois, and Wyoming coals with the results of distillation at low and high temperatures under vacuum and at atmospheric pressure. The effects of slow and rapid heating of coals and the secondary reactions as a result of heating gas and residue from slow, low-temperature carbonization are cited. The recent work of other experimentors is reviewed, says our contemporary, and the following conclusions drawn.

A high-grade bituminous coal of the gas-making type decomposes by heat primarily into paraffin hydrocarbons, and a completely altered non-volatile residue, with small quantities of water, carbon dioxide, and carbon monoxide. The three latter products are the first produced, although in small quantity. From some other types of bituminous coal, they are produced in greater relative quantities than from the gas-coal type. Complex and varied secondary reactions induced by superheating the hydrocarbons, water vapour, and carbon dioxide are of great importance in industrial high-temperature carbonization.

The products of low-temperature carbonization from coal of the Pittsburgh type on an industrial scale at about 800° to 900° Fahr. (427° to 482° C.) will consist of a rich gas amounting to 0·6 to 0·7 c.ft. per pound of coal, and a large yield of oil or tar, comprising 10 to 12 p.ct. of the coal. This tar consists chiefly of paraffin hydrocarbons, is very low in (or possibly entirely devoid of) benzene and naphthalene derivatives, and practically devoid of free carbon. The gas will contain 6 to 7 p.ct. of unsaturated hydrocarbons and 20 to 25 p.ct. of ethane and its higher homologues, and consequently will have a high calorific and illuminating value. The tar may be either redistilled or subjected to cracking processes, so as to produce light oils (gasoline substitutes) whose yield will be greater than, and probably at least double, that obtained by high-temperature carbonization.

The results suggest the possibility that low-temperature carbonization might be utilized in gas manufacture as an enriching process by passing through the low-temperature retorts a relatively large quantity of a thin gas, such as blue water gas, sweeping-out the light oil vapours that are primarily liberated at these low temperatures. The utilization of inferior coals for making gas by such a process may be found practicable.

Based on the experimental results of low-temperature decomposition in a vacuum, the following hypothesis is proposed for the constitution of coal.

All kinds of coal consist of cellulosic degradation products more or less altered by the processes of aging, together with derivatives of resinous substances in different proportions, also more or less altered. These substances are many in number, and closely graded into one another in their nature and composition. They all undergo decomposition on moderate heating. Some, however, decompose more rapidly than others at the lower temperatures. The less altered cellulosic derivatives decompose more easily than the more altered derivatives, and also more easily than the resinous derivatives. The cellulosic derivatives on moderate heating decompose so as to yield water, carbon dioxide, carbon monoxide, and hydrocarbons, giving less of the first three products the more mature and altered they are. The resinous derivatives, on the other hand, decompose on moderate heating, so as to yield principally the paraffin hydrocarbons, with probably hydrogen also as a direct decomposition product.

The more mature bituminous coals with good coking properties contain a large percentage of resinous derivatives, and their cellulosic constituents have been highly altered. The younger bituminous and sub-bituminous coals consist chiefly of cellulosic derivatives much less altered than those in the older coals. They undergo a large amount of decomposition below their fusion points, and (partly for this reason) many of them do not coke.

North British Association of Gas Managers.—The annual meeting will be held in the hall of the Philosophical Society, Bath Street, Glasgow, on Friday, Sept. 7, under the presidency of Mr. J. Lang, the Engineer and Manager of the Vale of Leven Gas Company, Alexandria, Dumbartonshire.

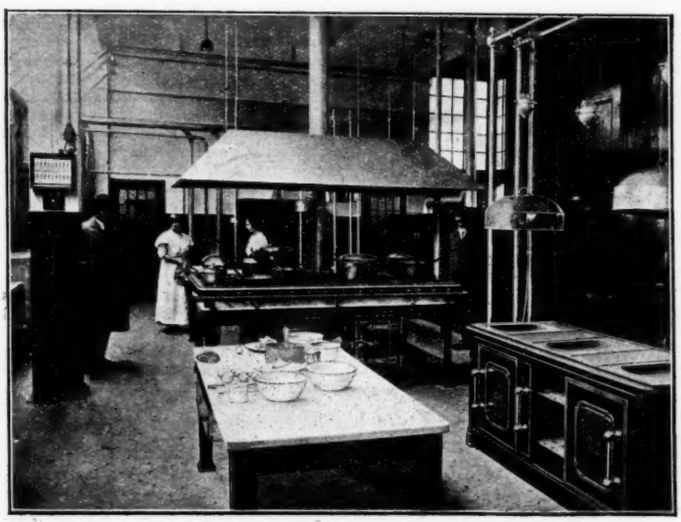
Control of Incandescent Mantles in Germany.—It is reported in the "Ironmonger" that the incandescent mantle industry in Germany will shortly be put under a scheme of rationing, which is expected to have for its first result a reduction of the still very considerable export trade. Even at the present time, German incandescent mantles are sold abroad at lower prices than those ruling in the home market; and it is suspected that large quantities of them reach enemy countries *viâ* neutral States.

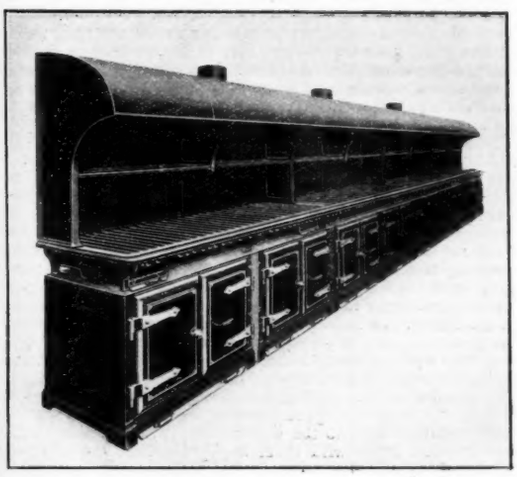
BOURNEMOUTH MOTORS ALTERED FOR COAL GAS USE.

Mr. PHILIP G. G. MOON, the Acting General Manager of the Bournemouth Gas and Water Company, sends a photograph of two of their motors which have been altered for the use of coal gas, and are running quite satisfactorily. He remarks that the change was easily made, and many of the lorry and char-a-banc owners in the district are now altering their vehicles for use with coal gas.

WRIGHT'S CANTEEN GAS APPARATUS.

MESSRS. JOHN WRIGHT & CO., of Birmingham, send some photographs of large installations of canteen plant and fittings of exceptional size which they have recently completed.





The first, which is here reproduced, shows a part of one of two kitchens at large munition works in the Midland district. In the foreground are to be seen a carving table and hot closet with three recesses and overhead gear; a central range, having four ovens and extended hot plate and hood; and beyond this a large roaster and a hot closet. In addition to what appear in the photograph, the installation includes: Two "Celt" vegetable and pudding steamers; three vegetable boilers with baskets; a "Cito" griller and toaster on stand; another hot closet similar to that shown; an "Atlas" stockpot and stand; an additional "Sector" hot closet and carving table to that shown in the foreground of the photograph; and three tea boilers. In the servery, which occupies part of a gallery running all round the large dining room where the apparatus is installed, there are also two hot closets and two tea-boilers. The installation also includes ten of the firm's "Canteno" boilers for delivering an immediate and constant supply of boiling water for tea-making purposes.

The second photograph shows a very large range of roasting ovens, with continuous hot plate, plate rack, and hood, which, it is said, forms part of one of the most extensive installations of canteen apparatus ever fitted up in the country. The range here illustrated consists of eight full-sized ovens with double doors; and the length of the apparatus is about 30 ft.

Search for Oil in England.—Discussing the Petroleum Bill recently introduced into Parliament, the "Pall Mall Gazette" says that the opinion of a well-known expert is: "The chances of payable oil-fields being discovered in this country are, of course, speculative. But, then, such enterprises are always more or less speculative. Mining in its initial stages is, in most cases, nothing but a gamble. Herein lies the wisdom of Mr. Long's Bill. Oilfields of uncertain value are known to exist. The Bill eliminates the private speculator. The Government assume the risk, and if they 'strike oil' the country, and not a syndicate of capitalists, gets the benefit. The Bill places in the hands of the Government all rights to petroleum and natural gas. By all means let the State undertake the necessary boring. If payable fields be located, it will be an incalculable boon to the country. Modern industrial development has rendered oil absolutely essential." In the Bill, the expression "petroleum" means all petroleum and natural gas and their relative hydrocarbons (excluding coals and bituminous shales) existing in their natural condition in strata.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Belfast.

AFTER having met for some years in Dublin, the annual gathering of the Association took place last Tuesday in Belfast, when there was a fair muster of members in attendance, to take part in a busy day's proceedings. The meeting was held in the Council Chamber of the magnificent new Belfast City Hall, under the presidency of Mr. A. S. BROOK, of Lisburn.

A WELCOME TO THE CITY.

Sir CRAWFORD M'CULLAGH, ex-Lord Mayor, said he was sorry the Lord Mayor was away on an important business engagement. He had asked him to come and express his regret for his absence, and on behalf of the citizens to extend to the Association a warm welcome to the city. The members were there for their annual conference, to take into consideration matters that pertained to the welfare of their different undertakings, which, of course, represented both private and municipally owned concerns. He thought they would be able in Belfast to learn something that would be to their advantage, because the citizens were justly proud of their gas undertaking. He remembered, when he occupied the position of Lord Mayor, he rather took a pride in pointing out to the deputations and visitors who came along what had been accomplished in connection with the gas undertaking; and perhaps it would not be altogether out of place, although it might be ancient history to many present, to say that in Belfast they supplied practically as cheap gas as anywhere in the Kingdom. It was the cheapest in Ireland; and he believed there were only one or two towns in England or Scotland that equalled Belfast in this respect. This seemed to him an extraordinary thing; and, indeed, he had never been able altogether to explain it, having regard to the fact that they had to pay so much for the carriage of gas coal. It went to show that the Corporation had not starved the undertaking. In other words, they had, in his opinion, put in the best possible up-to-date machinery, financed the concern properly, and, above all, it had been well managed. In Belfast, in connection with their municipal trading undertakings, they endeavoured, whenever the need arose, as regarded the managership, to show no favour whatever, but to procure the best possible man—not caring whether he was English, Irish, or Scotch. The result, he thought, fully justified this policy. ["Hear, hear."] The success of their concern was dependent not only on the up-to-date machinery, but also on the management. No matter what machinery one might have, if it was not managed properly it was not going to be a great success. In Belfast, not only did they produce the cheap gas to which he had already referred, but they had been able to give large sums to the relief of the rates. In fact, the hall in which they were assembled was a monument to the Gas Department. The Corporation having secured the best site and the best design for the hall, the Gas Committee said, "We are going to help to pay, so that the burden may not fall altogether on the ratepayers." Therefore the Committee paid interest and sinking fund amounting to £11,300 a year, and they had contributed altogether £168,700 towards the hall. At the end of the sinking fund period the hall would be a free gift to the City of Belfast. There was no ground rent; and it would be absolutely clear of debt. He hoped the members would find their visit interesting; for, apart altogether from gas, there were many concerns in Belfast well worth seeing. They were justly proud of the fact that in the city some of the largest undertakings in the world were to be seen. The manufacture of gas at the lowest practicable price was of the greatest possible importance, not only for ordinary lighting, heating, and cooking purposes, but to enable the industrial concerns to compete with any others of a similar character; and their great aim in Belfast had been to furnish such a supply. At the gas-works, Mr. J. D. Smith, the Engineer and Manager, would be delighted to see the members, and to give them any information he could, because it was only right and proper that every undertaking should obtain what benefit was possible from what had been accomplished in Belfast in the direction of the production of cheap gas. Therefore, he hoped they would be able to spend a short time at the gas-works. He hoped, also, that their visit to the city would prove pleasant, and that they would carry home with them happy recollections of their meeting there. [Applause.]

The PRESIDENT, on behalf of the Association, thanked Sir Crawford M'Cullagh for giving them so hearty a welcome to the magnificent City of Belfast.

THE PRESIDENT'S MEDAL.

Sir CRAWFORD M'CULLAGH said he had one other pleasant function to perform. He had been asked to present to the President the gold medal which he had in his hand. The gift testified to a great deal of appreciation on the part of the members, and demonstrated that they were perfectly satisfied with what Mr. Brook had done for the Association. He hoped the President would live long to serve the community among whom he resided.

The PRESIDENT, in returning thanks, said that during his residence in Ireland he had been most comfortable, and had been well received wherever he had gone. There was really very little difference between the North of Ireland and his own County of Yorkshire.

APOLOGIES.

Apologies for absence were read from Mr. H. Kirkham (New Ross), Mr. J. Whimster (Armagh), and Mr. J. E. Enright (Tralee).

THE REPORT AND ACCOUNTS.

The HON. SECRETARY and TREASURER (Mr. G. Airth, of Dundalk) then read the report of the Committee. In this, reference was made to the discussion at the last annual meeting on the coal crisis, when it was agreed that the following resolution should be sent to the Board of Trade, the Irish parliamentary leaders, and the public bodies and Press of Ireland.

"That this meeting, representative of the gas industry in Ireland, views with the gravest apprehension the present condition of coal supply to Ireland, and is convinced, should this condition not be speedily relieved, many of the smaller gas-works and other industries must shut-down, with consequent loss and inconvenience to the public.

"We therefore urge upon the Government the extreme and immediate necessity for adopting such measures as will assure an adequate supply of coal at reasonable prices, including sea carriage.

"That a copy of this resolution be forwarded to the President of the Board of Trade, the Irish parliamentary leaders, and the public bodies and Press in Ireland.

"That a Sub-Committee of three members be appointed to deal with this matter, and if necessary seek an interview with the President of the Board of Trade."

This resolution has practically been adopted by all the parties mentioned, and forwarded to the proper quarters; and though, the Committee stated, it has so far met with no financial success, it may still have good results in the future. The Committee recommended that a donation of £3 3s. be sent to the Benevolent Fund of the Institution of Gas Engineers. The number of ballot papers received shows that many of the members are not taking that interest which is desirable in the Association; and the Committee asked them to take full advantage of their rights in this respect.

The AUDITOR (Mr. G. W. Norman, of Dublin) then went through the accounts, which showed a balance in hand of £51 16s. 7d. He added that the annual subscriptions were a little bit down; but though the balance-sheet showed a sum of about £10 less in hand, he believed the Secretary had nearly as much as this in hand already for back subscriptions.

COAL PRICES AND FREIGHTS.

Mr. J. PATERSON (Waterford), in moving the adoption of the report and accounts, said, with regard to the proposed donation to the Benevolent Fund, this was a very worthy object, and it was a commendable recommendation to come from the Committee. As to the question of coal prices and freights, he would like to ask the Committee if there had ever been any favourable outcome as the result of all the communications they had entered into. So far as he could gather, coal prices were not coming down, but soaring upwards; and as to freights, they were abnormally high. They had increased about 30 p.ct. since this time last year, when the Committee took the matter in hand; so that, while the Committee hoped that good would follow the steps they had adopted, he was sorry the results up to now had proved contrary. The question arose, Could the Association do anything more than they had done in the way of bringing pressure to bear on the "powers that be" to relieve the Irish gas undertakings of this abnormal cost of coal and freights? It was placing all Irish gas-works at a great disadvantage. The Government were appealing to undertakings to produce as much gas as possible, while giving the proprietors no facilities to do so. A great many companies and authorities were limited in the price they could charge; and yet they could not see their way to limit the prices coal-owners could charge for coal, and that ship-owners could charge for freight. It was an unenviable position for the gas undertakings to find themselves in; and the Committee should bring pressure to bear on the authorities. He thought that if the representatives of the larger gas undertakings of the country could be induced to lend their assistance, good might come of it.

Mr. J. WOODS (Bishop's Castle) seconded the motion, and referring to freight prices, remarked that a great deal of time had been given to the question, and his own opinion was that, unless the Government took control of the shipping and fixed the rates, the Committee would be unable really to do anything in the matter.

The report and accounts were then unanimously adopted.

OFFICE BEARERS AND NEW MEMBERS.

Mr. T. Duncan (Glasgow) and Mr. T. Duxbury (Manchester) were appointed Scrutineers; and they reported that the following had been unanimously elected:

President.—Mr. H. Kirkham, of New Ross.
Vice-President.—Mr. H. W. Saville, of Drogheda.
Members of Committee.—Mr. D. M'Intyre, of Dungannon; Mr. R. Kneeshaw, Jun., of Clonmel; and Mr. P. B. Ellacott, of Newry.
Auditor.—Mr. G. W. Norman, of Dublin.
Hon. Secretary and Treasurer.—Mr. G. Airth, of Dundalk.
New Members.—Mr. J. A. Pemberton, of Skibbereen; Mr. M. J. White, of Youghal; Mr. G. Hale, of Kinsale; Mr. Thomas Whimster, of Armagh; and Mr. F. R. Anderson, of Cavan.
New Extraordinary Member.—Mr. F. G. Ambler, of Leeds.

REPORT OF THE DISTRICT REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

The PRESIDENT said that, as District Representative of the Association on the Institution of Gas Engineers, he had to express regret that he had attended very few of the large number of meetings that had been called. He would venture to say that the Institution of Gas Engineers had never called more meetings for a considerable number of years than in the past one. The twelve months had been crowded with matters of the utmost importance; and the thanks of the gas industry were due to those members of the Institution Council who had ungrudgingly devoted time and energy, especially in the matter of requests and consultations with the Ministry of Munitions. In the annual report of the Council, they referred to the continued and increasing help rendered to the High Explosives Department of the Ministry of Munitions in the essential ingredients in the filling of shells. The most outstanding

feature during the year was the acceptance of the presidency of the Institution by the Rt. Hon. Lord Moulton, K.C.B., F.R.S., who is the Director General of Explosive Supply. He had the pleasure of hearing Lord Moulton's speech in returning thanks to the members of the Institution at the annual meeting in June, and of attending the luncheon given by the retiring President to meet Lord Moulton. His Lordship's high appreciation of the work done by the gas industry, as expressed by him, could not fail to render excellent service to the industry as a whole. The Home Office Committee consulted the Institution with reference to the effect of the Summer Time Act, and expressed their appreciation of the assistance rendered. The Council of the Gas Institution were doing good work for the industry and for the country at large.

THE PRESIDENTIAL ADDRESS.

The PRESIDENT next proceeded to deliver his Inaugural Address, which will be found in last week's "JOURNAL" [pp. 271-2]. At its conclusion,

Mr. T. FRIZELLE (Holywood), in proposing a vote of thanks to Mr. Brook, said it was one of the best addresses he had ever listened to. Many points had been touched upon that were of real interest to the managers of small works, especially at the present time, when they were in difficulties in every direction. Of course, the labour question was not so acute with them as it was in England and Scotland, where young men had to join the army. But the high wages that were being paid by the munition works and by the Government had made them in Ireland dip deeper into their pockets. To refer to another point, they were always getting notice of a rise in the price of sulphuric acid; and at the same time the Government kept sulphate of ammonia at a fixed price. They asked them to make as much sulphate as they could, and to supply the farmers at as low a rate as possible, and yet they allowed the acid makers to raise the price of vitriol. The question of salaries the President did not touch upon. A circular might be sent from the Association to gas authorities and companies, drawing their attention to the increased cost of living, and pointing out that the labourers had in different cases received increases of from 25 to 55 p.ct., and that managers of small works should be treated at least as generously. If a man was paid properly, he would give of his best to his company or council; but his employers must look to it that he was adequately rewarded. He often feared that under-payment might be the means of making a man dishonest. A poorly paid man must get his supplies somehow and from somewhere; and if the companies and councils regarded the matter from a proper standpoint, they would pay their men adequately. He had no grievance himself; but he spoke from what he knew of the cases of a good many other men in Ireland.

Mr. W. H. ROBERTS (Newtownards) seconded the proposition, and added that he thought the proposal which was to come before them regarding the formation of a Commercial Section was a most important matter, which they should seriously consider.

The vote of thanks having been cordially accorded,

The PRESIDENT returned thanks, and said that if the Commercial Section were brought about, he was sure more interest would be taken in the Association. He then asked Mr. Reid to introduce this subject.

A PROPOSED COMMERCIAL SECTION.

Mr. T. J. REID (Ballina) said that the subject which he had been asked to introduce was, as they had already been informed by the President, the proposed formation of a Commercial Section in connection with the Association. He had himself really come to think that this was the most important proposition which had come forward at any of the meetings since the Association was started. He did not claim to have any special knowledge concerning how such a Commercial Section should be worked, or what it really would be. In fact, he thought it was this want of knowledge on his part which determined his selection by the Committee, following high precedent in such matters, to act as sponsor for the proposal at that meeting. However, be that as it might, he made the confession for two reasons. First of all, that the subject might not be prejudiced by any deficiency in his advocacy of it; and, secondly, that he might preserve a certain line of retreat should he deal with the matter wrongly. To further preserve this position, he might say that the proposal was really the President's. There were certain advantages in approaching a subject of which one had no prior knowledge. One could approach it freely, and without any of the bias or prejudice which a more intimate knowledge would be sure to engender. Approaching the matter, therefore, with a mind free from all prejudice, he was, on considering the question, amazed at its possibilities. He came to think before very long that in the formation of this Commercial Section might be seen the possibility of resuscitating the Association, and putting it on an even higher plane than it had ever reached before.

THE POSITION OF THE ASSOCIATION.

It must be patent to every one of them that for some time past the Association had not, from some cause or another, taken the place it should as the only Association of its kind which could claim to be national. They had not had the attendances of ordinary members, or the support which they had a right to expect. Now, he thought it was time that they, as an Association, should ask themselves what really were the causes which prevented it from being the important factor which it should be in the progress of the industry. They should try to find out if there was anything in the Association, or any deficiency in it, which prevented its advantages being made use of by the ordinary members more than had been the case. He did not think they could claim the incidence of the war as the cause of this, because signs were not wanting before the war broke out that the Association was slowly declining. Now, in connection with this fact, he might remark that it had often been a matter of wonder to him that more enthusiasm had not been shown by some of the ordinary members in the Association. If one read the list of attendances and studied what was done at the meetings, it would be seen that the changes were rung over a very few members. This was not as it should be. The Association should represent, and should loyally represent, the entire gas industry in Ireland; and every gas manager should feel in coming to the meetings that he was coming to an Association which was really his own, and in the proceedings of which he should take a part, as he would in any other meeting of a similar kind. This had not been the case; and he would like something to be done that might make the Association appeal to every person interested in gas-works in Ireland, and might compel him to join it in his own interest. Further, he had often noticed, and he had wondered why, the larger gas concerns in Ireland did not identify themselves more closely with the Association. He had often tried to understand the psychology of the persons in control of these works, which prevented them taking a part in the proceedings as they should do. He thought their action compared very unfavourably with what occurred across the water, where the managers of the very largest gas-works did not think it out of place to join in discussions in the smallest Associations. Without endeavouring to ascribe reasons for this, he would earnestly appeal to them to join and make the Association what it should be—a really National Association, solely concerned with the furtherance of the welfare of the industry. He did not care what was the size of the works a man might be manager of, he could not afford to comfort himself in a splendid isolation and look down on his smaller brethren. This was a feeling which should not be. There was a certain community of interests which, deny it as one might, could not be got over. The gas industry in Ireland was not merely an aggregation of units—it was one great industry; and what affected one particular gas-works would affect the whole. Even the largest works were affected by what occurred in the smaller places. They could not get over the fact that they were all of them for creating good atmospheres at the present time; and they must create a good atmosphere for gas. Anything which retarded this was inimical to the welfare of each individual works and must react all over the country, and all over the industry, for the matter of that. He had referred to this point particularly, because it was always a matter of wonder to him, as he had said, why the larger works should not be more closely represented in the deliberations of the Association. It surely could not be that those who managed the larger concerns thought it would be beneath their dignity to attend the meetings. He could not believe this was their reason. It would be a stupid and improper attitude to ascribe to them. But a letter had just been handed to him which would seem to show that it might be true. It was from an official of one of the large gas-works; and he would be very sorry, for the sake of the larger concerns, if the reasons given by him for keeping out of the Association should be the same reason which kept others from joining. He did not wish to say anything which would keep them out. They all wanted them in, because, if the bigger men could not learn anything, they could at any rate by their presence allow it to be said that the Association did really represent the whole gas industry in Ireland. The writer of the letter said that, as his name was now before the Institution of Gas Engineers, and as he was a member of many engineering and scientific bodies, he did not wish to join the Irish Association. This did not seem to be a sufficient reason for his refusal. It could not do him any harm to give of his knowledge to his poorer brethren. [Applause.]

THE USES OF A COMMERCIAL SECTION.

Now, he had done with this phase of the subject. They might not think it had anything to do with the formation of a Commercial Section; but indirectly it did bear upon it. They did want the Association to really represent the whole industry of Ireland, big or small; and he wished to extend to the managers of the larger works a most cordial invitation to come and help them. They could not keep separate. He had referred to the community of interests which existed in the country; and it was when he considered this question of a Commercial Section more closely that he came to think that in this way, by the formation of a Commercial Section, they might induce those who had not hitherto seen fit to join the Association, or to take any active part in it, to do so. It seemed strange that members of the Association and of the industry, who were at all times ready to put any technical knowledge or skill at the service of a brother, should be so reluctant to give information about the commercial side of their concerns, which might be far more valuable than any technical knowledge. The Commercial Section he had visualized was not like any he had heard or read of; but at any rate he would give his ideas to the meeting for what they were worth. No doubt members with a more practical knowledge of the subject would be able to reduce the building that he proposed to raise to more adequate proportions. Some years ago, there was a question which exercised opinion very greatly in the Association, and that was the question of associated management *versus* individual management. It was rather a vexed question at the time. He wanted to tread very carefully here; for he was not advocating associated management or anything of the sort. When he spoke of "associated management" in this connection, it would be merely be an academical term. There was no doubt whatever there were advantages attaching to associated management which must be apparent to all of them, and so need not be detailed. In the purchase of materials alone—take coal, for example—associated management was a decided advantage; and in the question of freights—which was the most important matter at the present time affecting their interests—it would be a similar advantage. In the distribution of the coal, and even in the supply of skilled labour, associated management clearly had advantages. He claimed that with a Commercial Section, they could attain all the benefits of associated management. There was no earthly reason why they should not undertake the purchase of materials in large quantities; and if they could not attain the advantages he had pointed out as appertaining to associated management, they might at least consider the question. There were, of course, many Commercial Sections in connection with Gas Associations across the water; but the conditions over there were quite different. On the other side, as he understood, they only concerned themselves with the disposal of residual products; but the section he had in mind would go further, and concern itself with everything that might properly be taken into account. Mr. Brook had handed him some information with regard to a Commercial Section with which he had been connected; and he gathered that the various undertakings associated with it were known by numbers, so that their identity could not be discovered. A fort-

nightly return of the prices and stocks of various residual products was sent regularly to the members who subscribed. If any information was required by individual members, the Secretary supplied it. Really, he was not trying to sketch any definite plan of what their own Commercial Section should be. It was his duty simply to recommend the consideration of such a project by the meeting, and then to leave it to the discussion, which he hoped would be full and free, to devolve what he trusted would prove the salvation of the Association, put it in a position it was never in before, and make for the betterment of the industry as a whole and of every member connected with it.

Mr. J. PATERSON (Waterford) said that since he got the notice of the meeting, and saw by it that Mr. Reid was to bring forward this suggestion for the formation of a Commercial Section, he had been turning the thing over in his mind; and he could not quite gather what particular form this section was to take. Mr. Reid had, however, somewhat enlightened him. He had thought perhaps it was going to follow the lines of the sections in vogue across the Channel, which had been described as being for the purpose of dealing with the bye-products of the various undertakings. He did not think any of them took part in the purchase of materials or the distribution of them; and while he would not like to say that such a scheme could hardly be made workable, he certainly did assert that it would be a very difficult matter. Where there were a number of companies, and corporations, and committees to deal with, he was sure it would be very laborious, and machinery would have to be introduced to work it which would be so costly that few would join the movement. Mr. Reid had said that the proposal which he had brought forward was one of the most important matters the Association had ever had to consider. To a large extent, this might be true; but, of course, it depended upon the functions that would ultimately be performed by the section. Mr. Reid had touched upon the question of associated management, of which he had now had a little more experience than was the case when the subject was discussed by the Association a few years ago; and he had said that, whether they admitted it or whether they did not, there were advantages connected with associated management that could not be secured otherwise than by the formation of a Commercial Section. If it were admitted that associated management carried with it certain advantages, which could not be disputed, then every single member of the Association representing a gas undertaking would welcome the Commercial Section with open arms. If they were to derive advantages, not only in the purchasing and distribution of all the commodities which they required, but in the disposal of residuals—if it were going to be to the financial betterment of the concerns, no doubt every one would join it. But he could foresee that the Sub-Committee which would in all probability ultimately be formed to lick the section into shape would have their work cut out for them. Of course, it went without saying that no member would commit himself that day either one way or the other. Mr. Reid had referred to the non-attendance of members at the Association meetings. This was a most regrettable fact. There were some members who, like himself, could not attend regularly; but there were others who made no effort to do so. Why did they not attend and graciously lend their assistance at the meetings? There might be some who might not be able to learn much from the members' deliberations; but they could give of their knowledge. If there was any removable cause for their non-attendance, the matter should be looked into. As had been already pointed out, the greatest sinners in this respect were the representatives of the largest concerns in the country; and this made it doubly regrettable. He could quite conceive that managers of small places, for instance, in the South of Ireland, whose remuneration—particularly under present-day conditions with the high cost of living—was not large, might not be able to afford the cost of a long railway journey and hotel expenses; and he thought it was mentioned at one of the recent meetings that if representations were made to the small companies and municipalities or councils who were proprietors of gas-works, and they were asked to pay the expenses of their managers to attend these meetings, they might see that in all probability they would be the gainers in the long run by doing so. He threw out this suggestion to the Committee, as he was afraid that, without some such recommendation, they would be merely beating the air. He was quite in sympathy with the proposal to form a Commercial Section. They were not going to commit themselves one way or the other that day; but the proposal to consider the matter was worthy of support by all. If it were thought workable, probably Mr. Reid would later on propose that a small Sub-Committee should be formed to frame a report. If such a section were formed, all who joined it would have to act straightly and honourably; otherwise the thing would be useless.

FURTHER VIEWS.

Mr. W. H. ROBERTS (Newtownards) remarked that it was a matter in which he took a great interest, but about which he knew nothing. He did, however, feel satisfied that a Commercial Section formed in connection with the Association must prove a decided advantage. He would give it his whole-hearted support; and he was sure other members would give any assistance that might be required.

Mr. T. FRIZELLE (Holywood) also expressed sympathy with the idea of forming a Commercial Section. It was about time something like this was done for Ireland; but it could not be started without money. Money was the foundation of it; and where was it to come from? Was it the gas managers who were to support it, or their employers? They should, he thought, begin by considering this point. The advantages were all for their employers; and all the meetings and everything since the Association was started thirty years ago had been for the benefit of the community in which they lived. The ratepayers of every town and district had been benefited by the meetings which had been held. As any Commercial Section would be for the benefit of the employers, they should be asked if they would subscribe towards any expenses that might be incurred in its formation. There was a combination in connection with a number of works in the South and West of Ireland through which he believed the material for the works was purchased; and Mr. Reid could no doubt have enlightened them as to its advantages.

Mr. H. W. SAVILLE (Drogheda) thought the Committee were to be congratulated both on having raised this question and on having induced Mr. Reid to introduce it. The suggestion must appeal to them; but there were many difficulties in the way—particularly in the South. For instance, Mr. Airth and himself practically divided a county between them; and then some were paying double the freight others were. How could a Commercial Section attack this? At present they were practically in the hands of the Government and the Shipping Controller. No doubt some of them had made attempts to get something done through the Shipping Controller, and had had the same experience that he had—that the results were absolutely *nil*. They were simply left to work out their own salvation in the best manner they could. He did not see what a Commercial Section could do for them in a case like this. As to residuals, they could at the present time get any price they liked to ask for coke; and the chief trouble in pre-war times was the dumping of coke from across the water. One point which he had not heard raised was with regard to the price of sulphate of ammonia. They paid—taking it roughly—double as much for coal as was paid across the water; and yet they were fixed to the same price for sulphate as works with half the charge for coal. The latter works sent sulphate over to Ireland, and were subsidized to the extent of the carriage across; and the Irish works had to sell at the same price as they did. This, he thought, was very unfair; and they ought to be subsidized to the same extent as the English works, or at least to the extent of the difference in the cost of coal. Another difficulty in connection with purchasing in quantities was that many of them worked for corporations or councils; and they were bound to ask for tenders under the Public Bodies Order. He did not see, unless they were going to get this rule amended, how they could get a local authority to join a combined purchasing body. Any way, no doubt, they must approach their committees or directors before making any attempt to form a Commercial Section. To try and do it without their approval, or even without their support, would damn the whole thing from the beginning. While he did not say that there was any money required in the first instance, he did not regard this as the best moment to start the idea. It was a wonder they had not done it years ago in the North of Ireland; but he did not see, if it was applied to the whole of the country, what help it would be to them under present conditions. As to the attendance at the meetings, it was hard lines on those connected with the smaller works that the officials of the larger concerns should not take part in the proceedings.

Mr. W. MILLAR (Cookstown) said the idea of this Commercial Section proposal was that it would enable them to buy in the cheapest market and sell in the dearest. No doubt, if the members were kept properly posted up, they could get better prices for their residuals; and, as to buying coal, it was probable that if they let each other know a little more than they did, good might result to them. While hoping that something would be done in regard to forming this section, he did not think they would get much money out of the proprietors of gas undertakings. If, however, a circular was sent out, it might open their eyes.

Mr. R. G. TAYLOR (Malahide) said he desired to support the proposal for the formation of a Commercial Section. For one thing, if they could buy coal in large quantities, it would mean much to many of them in small works.

The PRESIDENT remarked that, in regard to his proposal for a Commercial Section, Mr. Reid had gone further than he had anticipated he would do. The suggestions he had placed before them were certainly deserving of consideration. In his own experience on the other side of the Channel, they never got any further than circularizing information with regard to the increased cost of coal from one year to another. Each member undertook that he would not sell in any other member's district coke or sulphate of ammonia at a less price than was being charged in the district. The section would have to start in a very small way, and then be developed as was found practicable. The section he had been connected with did very good work; and if loyalty could be depended upon among the members, there was no reason to fear starting the scheme there. The Council he was with paid the subscription, which was quite a nominal sum—10s. a year. Any manager connected with a council could get it through, if the committee consented to pay it, by having the receipt written out in a special form to meet the requirements of the Local Government Board Auditor. Already this Council subscribed to the Sulphate of Ammonia Association, and the Auditors saw it and passed it, because it was for information which was necessary to the successful carrying-on of the undertaking. There was no difficulty about that. For circularizing information, every works had a number, and the information was sent on post-cards; so that if a post-card fell into the hands of someone interested in the sales, he would have no knowledge of what it referred to. A key was supplied, which was kept by the members of the section. If any difficulty should be found in the working, he did not see why there should not be four sections for the North, South, East, and West of Ireland. He hoped the proposal would be given a trial; and if there was any trouble in getting councils or companies to pay the cost of sending out the information, or even of attending the meetings, steps might be taken to show them that the scheme would benefit their undertaking.

MR. REID'S REPLY.

Mr. REID remarked that he had very little to reply to. He was rather disappointed that more of the members had not joined in the discussion. What had been said seemed, on the whole, to be favourable to the scheme. Some speakers had raised the very difficulties which the section would be designed to overcome. It was with the very idea of getting over these difficulties that the section would be formed. It would not be possible to attain right away to the Commercial Section he had visualized. Turning for a moment to the question of coal. What he himself did was to get a steamer of 300 or 400 tons into Dublin. He had to get it this way now; but it was a congested port, and labour troubles were acute—steamers being in consequence held up. Then there was difficulty in providing wagons, because the coal would all have to go into one railway company's wagons. Suppose, however, that a steamer arrived, and he could dump his coal into as many railway companies' wagons as he pleased, this would expedite the unloading of the steamer, and enable them to supply coal in the smaller quantities which would suit the undertakings having a small

amount of capital in hand. Everybody, it seemed, would like to see the section started; but they feared there were obstacles to be faced. It was not his intention to point out a royal road to overcome them; but he did not think their surmounting was beyond the powers of members of the Association. In connection with what he had been saying, he would like to refer to the work of the British Commercial Gas Association. Looking over the list of subscribers to this organization, he was sorry to see how very few Irish concerns were represented. It was, however, an Association which ought to appeal more particularly to the small undertakings than to the larger ones, because the subscription was based upon the amount of gas produced; and therefore the smaller concerns got all the benefits which the Association could give at a very trifling cost. He could not speak too highly of the work of the British Commercial Gas Association. The publications issued by the Association were alone worth the amount of the subscription the smaller undertakings were called upon to pay. They were excellent productions; and if members were in any difficulty, the Secretary was always willing to oblige. Every member of their Association should get the concern with which he was connected to subscribe its quota. The question had been asked, "Where is the money to come from?" It was not the intention that the Association should find the money; it was the concerns with which they were connected that should do this. It was a remarkable fact that the Association, though it had met for thirty years as the Irish Association of Gas Managers, had never done anything to further the individual interests of their gas managers. Something definite, he hoped, might take shape out of what he had said and the criticism that had been offered. He would suggest that a Committee be formed to look into the matter, and see if a Commercial Section could be started which would be beneficial to the members of the Association and to the works with which they were connected, and thereby to the gas industry generally.

ELECTION OF DISTRICT REPRESENTATIVE.

The PRESIDENT proposed, and it was agreed, that Mr. H. Kirkham, of New Ross, the incoming President, should be the District Representative on the Council of the Institution of Gas Engineers for the coming year.

NEXT MEETING PLACE.

The PRESIDENT announced that the next meeting of the Association would be held in Dublin.

LUNCHEON.

The proceedings were then adjourned for luncheon at Ye Olde Castle Restaurant, at which the members and friends were the guests of the President.

Intermittent Vertical Retorts for Medium-Sized and Small Gas-Works.

On re-assembling in the afternoon, Mr. J. G. AMBLER, of Messrs. Goodall, Clayton, & Co., Ltd., of Leeds, read the paper on "Intermittent Vertical Retorts for Medium-Sized and Small Gas-Works" which was published in last week's "JOURNAL," p. 276 9.

The PRESIDENT said he was sure they were all very much obliged to Mr. Ambler for the trouble he had taken to come and read his paper. He (the speaker) had the pleasure, when he was visiting England a few months ago, of going to his native town of Ossett to inspect their installation of vertical retorts. He was agreeably surprised with the easy way in which all the coal was handled, and also with this system of discharging. Practically all the heavy work was done away with. He was specially interested in the arrangement for the sealing of the hydraulic main. A matter which concerned them was whether or not for small gas-works there was any advantage, taking into account the cost of these installations. He had looked at the matter in a good many ways, and some years ago considered, in connection with the Lisburn Gas-Works, whether or not verticals would be the best thing to put in. Really, he had yet to be convinced that vertical retorts were the thing for very small gas-works. They were, however, certainly doing wonders, and were likely to progress still further, because, of course, they were still in their infancy. In fact, vertical retorts were very useful if one had a works with the necessary output of gas.

Mr. W. MILLAR (Cookstown) asked whether there was any installation round about like the one referred to, which the manager of a small works could see in operation. Supposing the elevating machinery were eliminated, how would the cost of the system compare with an installation in the old style? Some people said the coke was smaller than with horizontals; and he would like to know what was the difference in the quality of the coke made by these intermittent verticals, as compared with the continuous type. Would it be possible to make the system pay in a 10 million c.ft. works?

Mr. T. J. REID (Ballina) inquired how the cost of production compared with that of the system described a year ago by Mr. Enright, of Tralee. He referred to the methane-hydrogen plant. If the advantages claimed to be obtained with the plant described last year could be maintained in practice, he did not think, either from the point of view of initial cost of erection or of working results themselves, that auy system of retorts, vertical or otherwise, could compete with it.

Mr. J. PATERSON (Waterford) remarked that most of them already had a carbonizing system in a good state of preservation or otherwise. If one's retorts were worn out, and it was a question of putting in new ones, then they could consider whether it was more advantageous to adopt horizontals or verticals. In such a case, verticals might be found better; but where there were already horizontals in a fairly good condition, and doing their work well, small works could hardly consider the question of going to the expense of putting in an installation of verticals, whether intermittent or continuous. He could quite appreciate that, for small works, speaking generally, the intermittent system was the more suitable. The author, however, said the system was "positive and definite," which was a big claim to make. It lent itself to the steaming arrangement; and the results given by the steaming were exceedingly good, both as regards make and quality of gas. The yield of coke for sale, too, was quite excellent. In fact, if all that was claimed in the paper was realized in actual practice, as appeared to be proved by the tables at the end, he would predict for it a long and well-deserved spell of prosperity. The author referred to the fact that some settings built of the same fire-clay maker's material, and working under the same conditions, were worked-out considerably quicker than others. Perhaps some of them knew why this was. There was another factor besides the quality of the material used, and that was the workmanship put into it. One great objection to these vertical settings applied very forcibly in his own case, and that was the extra strong foundations required. The settings covered a comparatively small area, and had to carry an enormous weight of material; and where the works were situated on boggy ground, it was very difficult to get a good foundation. At Waterford, the works were practically on a bog, and the ground had to be carefully piled; and it was a question whether they could get any foundations strong enough to carry the enormous weight of these settings.

Mr. T. FRIZELLE (Holywood) asked what size of works was the smallest Mr. Ambler would recommend for this system of vertical retorts.

Mr. AMBLER: Fifteen million cubic feet per annum.

Mr. FRIZELLE (continuing) remarked that these retorts held a good quantity of coal; and in a small works with an output of 15 million cubic feet per annum, the make per day would not be very considerable. It was stated that these vertical retorts took a full charge of 9 cwt. With horizontal retorts they knew the latter part of the charge was not of the same illuminating power as the first. With these verticals taking 9 cwt., there would be a large amount of this tail-end of the charge at one time; and unless there was spare holder room—and where was there a small gas-works with two or three holders?—this poor gas would be getting out into the mains, and there would be an outcry. His own opinion was that the continuous vertical was the system for a works making down to 30 million cubic feet—not less. The coal went in continuously, and the gas was made in a constant stream. The result was that the gas was mixed up all together, and there was not the difference in quality to which he had referred. It was possible to get a very good make of gas. He must say that he put very little faith in statistics prepared for the purpose of being printed. He would prefer to go to a works where the retorts had been put up, and make inquiries for himself.

Mr. AMBLER, in reply, said, as to lifting and elevating machinery, for a very small installation it certainly would not pay to put in an elevator and the necessary machinery. There could be substituted an ordinary hoist with a gas-engine, which was far less expensive. The coke from intermittent verticals was harder and denser than from horizontals; and it could be screened to sizes to suit almost any purpose. It had been said that it was more economical than coke from horizontal or inclined retorts. The nearest installation to Belfast was at Banbridge. Working costs, of course, varied according to wages; but the information he had on this point was of a somewhat private nature. Mr. Nelson, the President-elect of the North of England Association of Gas Managers, would, however, he believed, be dealing with the subject. As to the use of the expression "positive," a known weight of coal was placed in the retort and carbonized. This was what he called a positive method of carbonization. The "definite" working was simply the regular discharging and charging of the retorts. All work in connection with the system was definite and regular. When speaking of refractory materials, he was assuming that the workmanship was in all cases equal. Something must be done to keep the clay up to standard. In connection with what had been said about the result in a small works of placing 9 cwt. of coal in a retort at a time, it must be remembered that it was not the practice to charge all the retorts at once. They were split up. In the case of four retorts, they would charge two at a time; and to add to the flexibility, there was the steam which could be cut off.

Mr. PATERSON pointed out that a question had been put by Mr. Millar as to the comparative cost of an installation on this system and horizontals. He did not know whether the author was prepared to give this offhand.

Mr. AMBLER said that, without quoting any figures, the first charge would be higher in the case of all verticals.

DIFFICULTIES EXPERIENCED AT MALLOW.

Mr. P. J. PHILPOTT then read a paper entitled "Exceptional Difficulties Experienced in the Administration of the Mallow Gas Undertaking." This, with a report of the discussion that took place, will be found on pp. 332-3.

THE SECRETARY AND TREASURER.

The PRESIDENT said they were now coming to the close of the meeting; and he wished to propose a hearty vote of thanks to their Hon. Secretary and Treasurer. Mr. Airth had been a very strong friend of the Irish Association. They had all sympathized with him in the unfortunate accident by which he had sustained a broken arm.

Mr. H. W. SAVILLE (Drogheda) seconded, and remarked that their Secretary had done much to keep the Association together.

The vote was cordially passed, and acknowledged by Mr. AIRTH.

AT THE BELFAST GAS-WORKS.

The short time that remained between the closing of the meeting and the hour fixed for the dinner was made good use of by a party of members taking advantage of the permission accorded to visit the Corporation Gas-Works in Ormeau Road. On arrival, they were met by Mr. J. D. Smith (the Engineer and Manager), who showed them the working arrangements of the Glover-West continuous vertical retorts. All the coal gas at Belfast is being made in these vertical retorts, of which there are two houses. The house first erected contains 80 retorts, and the one inspected by the members 160; and after five years' working, it has only just been necessary to start renewing the original retorts. The larger house has a capacity of 5½ million c.ft. of gas per day. Coal can be

elevated at the rate of 50 tons per hour, and passed into hoppers running along over the retorts of sufficient size to hold 48 hours' supply. Not a shovel touches the coal from the time it leaves the barge until it becomes coke. Much interest was also taken in a telpher plant which has been put up by Messrs. R. Dempster and Sons for the purpose of dealing with the coke. By means of this, coke can be taken in skips from the large hopper into which it is passed by a conveyor from the retort-house and deposited in the yard or on to either of two jigging screens which separate the large from the small. The large coke is allowed to fall straight away into bags, just as it comes from the retorts, and is sent out to customers, or it can be run from screens into railway wagons. Everything is electrically equipped; the current being generated by three sets of twin gas-engines which are started by means of compressed air. The arrangement is for each set to be one day working and two days off. There is exhausting plant equal to dealing with 10 million c.ft. of gas per day, and carburetted water-gas plant—six sets of Humphreys and Glasgow's make—of a capacity of 5 million c.ft. a day. The two houses of original hand-stoked coal-gas settings which remain are, as already remarked, not now used, except in cases of emergency. There is promise in due course of further extensions—in the fact that the Corporation have acquired an additional 4 acres of land on one side of their chemical works and 2 acres on the other.

The features noted here were pointed out to them; and the members were then obliged to take leave of Mr. Smith, in order that the remainder of the programme might be adhered to.

THE ANNUAL DINNER.

In the evening, a large party of members and friends met again in Ye Olde Castle Restaurant, where dinner, with music and song, and a little speech-making, brought a successful day's programme to a close. After "The King," Mr. A. M'Nally (the Chairman of the Lisburn Urban District Council) proposed the toast of "Prosperity to the Irish Association of Gas Managers," coupled with the name of the President, who responded, and then submitted "The Hon. Secretary and Treasurer," which was replied to by Mr. Airth. The toast of "The Ladies" having been proposed by Mr. S. Freeman Burrows, the President was heartily thanked, on the proposition of Mr. J. Paterson, of Waterford, for the excellent musical programme he had provided.

THE EXCURSION.

As usual, in connection with these meetings, Mr. Airth had mapped-out a tempting programme for a day's outing on Wednesday; and he was rewarded by finding a large party assembled at the railway station at the time of departure of the train for Newcastle, co. Down. Saloon carriages had been reserved; and in these a pleasant journey was made, through some beautiful scenery, to the typical little Irish seaside resort which the Secretary had made the objective of the excursion. Dinner and tea were well served in the large Slieve Donard Hotel which has been erected to meet the needs of visitors by the Belfast and County Down Railway Company; and the remainder of the time passed all too quickly amid the attractions of sea and mountain.

THE BANGOR GAS-WORKS.

Several of the members who had been able to remain in Belfast overnight were afforded an opportunity on Thursday of inspecting the gas-works at Bangor, which is a flourishing seaside place near the city. Bangor has of recent years—no doubt owing in part at all events to the progressive policy of the railway authorities—been going ahead at a very rapid rate; and to the visitors last week there was proof that to-day it stands high in popular favour. With the town, of course, the gas-works have also gone ahead. In fact, instead of having to look for business, the gas undertaking has, as it were, been taken along by the town. For instance, when Mr. B. Mitchell, the Engineer and Manager, was appointed some sixteen years ago, the make of gas was about 10 million c.ft. a year; whereas now it has reached 60 millions. Such expansion in output as this has naturally called for additional manufacturing facilities; and, indeed, since Mr. Mitchell has been there the works have been modernized throughout. They are now excellently arranged in every respect, and have a well-kept appearance. As in Belfast, the carbonizing plant in use is an installation of Glover-West continuous verticals, of which there are two beds of sixes. The vertical system proved particularly suitable for Bangor, from considerations of ground space. Since the retorts were installed three years ago, they have never given the slightest trouble; and the question of renewal has not even been thought of. The coal elevating and coke extracting plant is gas-engine driven. The two exhausters are steam-driven; and there is on the works a sulphate plant equal to making 1 ton per day. At present there is storage for coal (which is all sea-borne) to the extent of about 1100 tons; and a scheme for extending this will probably be taken in hand later on. The storage requirements are met by a two lift spiral-guided gasholder, by Messrs. C. & W. Walker, of 230,000 c.ft. capacity, and a smaller one to contain 60,000 c.ft.

An interesting point was drawn attention to in connection with the purifiers. Some time ago, while diverting a watercourse, Mr. Mitchell found himself with more cement than he actually required; and as he was just then contemplating erecting two new purifiers, he determined to make them of concrete. He did so; and they have proved most satisfactory. He would do the same thing over again; and, in fact, everything is arranged to put in another two. The scarcity of rubber led him to try the experiment of using for luting Manilla rope, with a "worm," boiled in tallow, and simply secured underneath the lid by thin copper wire to keep it in position. After the first screw-down, it adheres to the lid without any fastening at all; and it has proved to fulfil admirably the purpose for which it was intended.

EXCEPTIONAL DIFFICULTIES IN THE ADMINISTRATION OF THE MALLOW GAS UNDERTAKING.

By P. J. PHILPOTT, of Mallow.

[A Paper read before the Irish Association of Gas Managers. Aug. 14.]

In the year 1910, the Mallow gas undertaking passed into the hands of its present owners, the Urban District Council of Mallow, by compulsory purchase. At that time few imagined the present condition of affairs; and it is safe to assume that those responsible for the framing of Special Acts of Parliament as applied to gas undertakings were not in the know. I make these opening observations because experience has taught me that in many cases the Acts were hastily conceived, and thus imposed much extra work and responsibility on managers' shoulders, without, in many cases, achieving the desired results. It was, however, up to all of us to shoulder these burdens cheerfully and to do what could be done in the interest of the State. And so we go on to the difficulties.

WAR TIME COAL SUPPLIES.

Coal, the prime factor in gas-works, has been responsible in my small undertaking for an increased expenditure of £600 per annum. There was no source to tap directly to counterbalance this effect. Repayments of loans contracted by the Council on behalf of the undertaking could have been easily met by the profits of the year's working, provided we had been working in normal times. Having, however, to meet an advance of 100 p.ct. on coal, our only way out was the levying of a gas-rate on the town. Fortunately, we enjoy the privilege of being an urban authority, and in the way mentioned can recover the loss that we sustained.

When our last advertisement appeared inviting tenders for the year's supply of coal we had only one response, and then f.o.b. had to be accepted, taking our chance of securing freightage. This was a source of worry, which had not to be faced heretofore, as the coal had previously been delivered to the works. Furthermore, there is now the added penalty of demurrage charges on unloading boats, and on delivery trucks, which are very often necessarily held up owing to the priority given, and rightly so, to Government shipping, which we are well aware has assumed huge proportions. I have been informed of such a case of hardship as the consignee having to pay as much as £80 demurrage claimed on a consignment of coal to a southern port, partly due to the cause mentioned.

Charter-parties of the present day schedule the boat's time for loading and unloading in what is called "running" hours. Previously this was done in working hours. The result is that if a boat of (say) 300 tons arrives at a port of discharge late on Christmas Eve, her time for clearance of cargo expires twenty-four hours later—and this is at a time when men are rather reluctant to embark on a new job. When one considers that freightage alone on this particular boat amounted to close on £250, as against a pre-war figure of £75, some idea may be gained of a manager's responsibilities under this heading alone.

Assuming that the vessel is successfully cleared, and demurrage charges avoided, the next difficulty experienced is the securing of sufficient railway trucks, the scarcity of which for ordinary purposes is aggravated by the shortage of manual labour and traction power, both having been commandeered to a very great extent for Government use. These difficulties had to be overcome by the institution of careful and efficient administration, built up on existing conditions.

LEAKAGES AND PUBLIC LIGHTING ARRANGEMENTS.

For instance, leakage of mains, &c., had to be reduced to a minimum. Public lighting, leaky services, and inaccurate registration of meters came under this heading. In regard to public lighting, the system, as arrangements stood, was to my mind more or less lax, reminding one of a purchaser measuring out his own quantity and, of course, giving himself the benefit of the doubt with a good drop of the scales. In order to satisfy myself on this point, I went round the district on several mornings and noted the hour at which the lamps were still alight and at which they should have been extinguished. Finally, I had to adopt the system of a lamplighter's record book kept on the works, recording the times of lighting and extinguishing. By this means any extra lighting would be charged to the owners. Even with the owners paying for public lighting, to my mind no practical method can be carried out with other than gas-works employees as lamplighters.

DEALING WITH CONSUMERS' COMPLAINTS.

On taking over the works, I had several complaints read to me as to the insufficiency of supply. I had not the services of a

really competent fitter—as a matter of fact, no one who, on receipt of such a complaint, would go further than to clean a burner or clear the nipple of a cooker to seek the cause of complaint. Such a thing as a kit-bag pressure gauge was new to a fitter in these parts. I therefore found it incumbent on myself to visit every consumer who had lodged a complaint for the second time, and succeeded in tracing the fault in the majority of cases to the service. As a result, I had fifty services relaid in six months.

A very singular thing about this matter was that, although the majority of the services were in a crumbled condition, no complaints of actual leakage were notified. The condition of these services was attributable to their having been laid too shallow, due to the main not being of sufficient depth to allow enough protection to the services. The only preventative other than lowering the main—which was out of the question—was to slieve the service with a piece of cast-iron main, filling in with pitch and tar. This was accordingly done, and had a most noticeable effect on the following quarter's accounts. No further complaints reached me on this account.

Inaccurate Registration of Meters.

Having put the services in order, my next item of investigation was to make sure of accurate measurement. One can more readily arrive at conclusions regarding the accuracy of the ordinary meter than of the slot meter. I have found cases of slot meters where gas had been consumed without being registered. The consumer, in order to keep possession of the most profitable article, passed a shilling or two through the slot prior to the collection. In our case it is extremely hard to follow the rule of removing through too small collections. During the year under discussion, close on thirty meters were removed for this and other reasons.

While on this point, it may be of interest to cite a cause of an exceptionally high jump in a quarter's consumption through an ordinary meter without any apparent reason. On investigating the cause, I found that in a disused part of a workshop adjoining the premises the flexible tube of a pendant had become so rusted that its own weight caused it to tear, and so sent the consumption up. The main cock never being turned off, the gas had escaped night and day unnoticed by the consumer. I have during my time never fixed pendants so arranged, as I have found them to be the cause of many complaints.

Combating a Labour Difficulty.

In small municipal undertakings it often falls to the lot of the manager to tackle the retort-house work. I have not escaped the ordeal. I refer to this, as I consider it is a long standing grievance, which is not always due to the other employees; the blame being very often attributable to encouragement on the part of urban representatives. I got my Council to pass certain resolutions, a copy of which was sent to the employees notifying them that the Council would not interfere with the Manager's decision. This had a salutary effect; and henceforth I did not experience the disappointment of finding the retort-house wholly unattended and the test light failing. Before that it was no strange matter to find that the stokers had shirked their jobs, leaving the Manager to go on with the work.

Experience of a Flood.

On Nov. 17 last, I was awakened at 5 a.m. by hearing shouting in the vicinity of the works. I slipped on my clothes, and went to investigate the cause of the alarm. I had not long to wait, as I found myself ankle deep in water outside my own door. I soon became aware that the flood was rapidly rising. By 11 a.m. the water had reached the furnace. Luckily I had a good stock in the holders, without which it would have been a case of "lights out." In spite of all difficulties, the engine was kept going until 11 a.m., when it became necessary to stop further work. Having made provision for the escape of steam from our setting to minimize contraction, I evacuated my position and got through the bedroom window to my house. I ascertained that damage of an extensive nature threatened a local flour merchant's premises, where a large quantity of grain was stored on the ground floor. In this establishment a producer gas plant is kept to work the main engine; our gas supplying an engine used for generating electric power. Had it not been for this engine coming to the rescue, very valuable material would have been destroyed. The producer plant was entirely thrown out of action.

The flood which caused the extinguishing of our fire, with the consequent cooling of the setting, was at its highest at noon on Friday, and did not recede sufficiently to restart until Saturday at 3 a.m. I, however, kept the town going without cessation of supply, and recommenced operations at 6 p.m. on Sunday with poor heats and six rivets of stock, having successfully pulled through what promised at first to be a case of "lights out." I retired to rest at midnight on Sunday, having undergone forty-eight hours' continuous work.

DISCUSSION.

The President (Mr. A. S. Brook, of Lisburn) said they could all sympathize with Mr. Philpott in the strenuous times he had gone through. He (the President) had seen the Mallow Gas-Works since the Council took them over; and he was sure the author had had a great deal of trouble in getting things shipshape.

Mr. H. W. Saville (Drogheda) said it was to be hoped that the experiences related by Mr. Philpott were altogether a thing of the past. When they heard a paper like this, it made them think it was a pity there was no Kipling in the gas profession to put into his phraseology the experiences of a gas manager. It was, of course, by such experiences as had been related that many of them learned what they knew. A manager should be ready to tackle such difficulties when they arose. Mr. Philpott would certainly feel that he was a much better gas manager as the result of what he had gone through. Those managers in many parts of England who only had to call in the next-door neighbour when in a difficulty did not know what gas management meant in Ireland.

Mr. J. Paterson (Waterford) said the experiences Mr. Philpott had related had been the experiences of most of them at some time or another. Great credit was due to him for the way in which he had acted. The Mallow gas undertaking was another example of compulsory purchase which turned out rather unfortunately, like several they had heard of before. What with legal, arbitration, and other expenses, the Council had paid pretty heavily by the time they got the concern, though it might have been a good paying thing before they took it over. He was very sorry to learn from the paper that, owing to certain specified difficulties, the principal of which was a 100 p.ct. increase or more in the cost of coal delivered at Mallow, they had had, in order to make ends meet, to resort to the striking of a rate-in-aid. It was a pity to do this. Could they not have increased the price of gas, or did their Act or Order restrict them in this respect? He did not care for the principle of levying a rate on every ratepayer to relieve the consumer in the matter of the price he should legitimately pay for his gas. The consumer was practically in the same position as some gas undertakings which strongly objected to subsidizing the electric light and tramways out of their profits. Of course, he knew what was done was not in any case Mr. Philpott's fault; but the fact remained that there was a rate-in-aid struck to enable the gas undertaking to pay its way. One remark the author made was with reference to the shallowness of service-pipes, and the corrosion in consequence of their proximity to the surface, and the fact that they were so near the surface because the mains would not permit of them being laid any deeper. He himself had had charge of a works where the mains were laid originally 21 in. deep—that was, with only 21 in. covering. It was a rocky subsoil; and he was surprised one day to find the top of the main actually showing above the road. On making investigations, he found this road had not been metalled for a considerable number of years; and the surface had worn-down about 1½ ft. If the Mallow Council were in such an awkward predicament that they had to strike a rate-in-aid, the probability was that they had starved their roads, and left the mains to come to the top.

Mr. W. H. Roberts (Newtownards) said it seemed to him that the Mallow Council were quite correct in striking a rate-in-aid. When the Council took over the works, no doubt the parties responsible were gas consumers; but now many of these persons, with the high price of gas, would probably have ceased to consume it—leaving to the remaining consumers the responsibility of meeting the big deficit. He had recently had a little experience for the first time of a very small gas-works; and he could say that managers of such places had his sympathy. Managers of small gas undertakings who were overcoming such difficulties deserved every credit for it.

Mr. S. Moore (Portrush) recalled a case in which there was supposed to be a great deal of leakage; but the manager, on investigation, found that the station meter was 5 p.ct. fast.

Mr. Philpott, in reply, said they had had to strike a rate-in-aid for the simple reason that they were limited in the price which they could charge for gas. Thus the course taken was the only means of recovering the loss sustained. He could not settle the point raised about the depth of the main, because there was no chart which would have shown him the original depth. He was informed that in the Company's time an attempt was made to lower the mains. The increase in the gas-rate, he believed, was not anything like the increase in the price of coal. The maximum price of gas was 5s. 9d. per 1000 c.ft.

Gas-Fired Boilers for the Repair of Automobile Tyres.

Writing to the "Rochester Gas and Electric News" [New York], Mr. Leo. J. Sullivan enlarges on the necessity of a regular supply of steam at even pressure, in the "curing" of automobile tyres under repair. By using a thermostatic device set at the requisite pressure—about 60 lbs.—risk of either under or over-curing is avoided; also unnecessary consumption of fuel. He describes the satisfactory replacement of a coal-fired boiler by a gas appliance, set in a pit to admit of the return of condensed water, at the works of the Union Vulcanizing Company, Rochester, N.Y., which gets up steam in 20 minutes, as compared with 1½ hours, avoids dust and ashes, which previously gave much trouble by settlement on the fresh cement, saves labour for watching and maintaining steam pressure, occupies only one-quarter the space, and increases both the quality and the quantity of the work done.

Calorific Power Orders.—The two latest Provisional Orders to be issued by the Local Government Board under this Act relate to the gas undertakings of the Borough of Blackpool and the Urban District Council of Bingley, Yorks.

The Illuminating Engineering Society of America announce that they are already in a position to circulate among the members (for the purpose of written discussion) four of the long list of papers already arranged for the Autumn Congress that has been abandoned in consequence of the war. There will be the President's Address and the following papers: "Report of the Committee on Nomenclature and Standards," by A. E. Kennelly, Chairman, and C. H. Sharp, Secretary; "Illuminating Engineering Publicity," by G. H. Stickney; "Economics of Large Building Lighting," by C. L. Law and J. E. Buckle; "Illumination Intensities in Large New York Department Stores," by W. F. Little and J. F. Dick. Other papers of this "Correspondence Convention" will be ready during October, November, and December.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Coal Controls.

SIR,—Will you kindly permit me to occupy a little space to air a grievance which is not peculiar to myself, though happily there can be few who are sufferers from a similar cause, to the same extent.

My trouble is with the Coal Controller, and is in relation to the Aberystwyth Gas Company, of which I am Chairman. This Company is in possession of two contracts for coal supplies from Ruabon, under which we thought ourselves provided for a period of about twelve months from the present date. The railway rates on these supplies are 5s. and 5s. 3d. per ton. The Coal Controller, whose province it is to reduce transport, proposes to despoil us these contracts, and to compel us to resort to South Wales for future supplies. It is practically admitted that the coal procurable from this field is very inferior, and that the transfer would involve extra haulage of about 300,000 ton-miles per annum. But this contention is met by the rejoinder that, by the transferring of our coal to North Wales, an even greater length of haulage will be saved; for deficient supplies there would have to be made good from Yorkshire. Now the extra freight from the latter area is not more than 4s. per ton, which, upon our weight of 4200 tons, amounts to £840. This is the extreme cost of sending into North Wales a quantity of coal equal to the requirements of my Company. What is to be the cost to Aberystwyth? At the lowest estimate, an increased price of 8d. per 1000 c.ft. on gas (£1600) and reduced dividends of £200—together, £1830 a year, to save £840!

To this the Coal Controller replies that it is not a question of money, but of transport. Against this, I contend that, to the poor people of Aberystwyth, it is very much a question of money, and that if the Government are so unconcerned about money considerations, why should they not take us over as a controlled concern? The mischief would not end there, however, for the inferior South Wales coal would necessitate the use of 25 p.ct. more; and this would create a proportionate demand for retorts and men. How are either to be obtained? I say it will be impracticable to obtain either! The Ministry of Munitions are making an earnest appeal for more tar; and this request must result in an increased employment of 10 p.ct. more men, and more retorts, estimated upon the total gas manufacture of the whole country.

How, then, is an out-of-the-way community, largely composed of women lodging-house keepers, to face the new conditions? Even now the management is kept in a state of perpetual unrest lest a single employee, in any department, should fall-out from any cause for a day or two! Further, on the subject of munitions, I am proud to say that, months ago, my Company, at considerable expense for so small an undertaking, laid down a plant for oil-washing and debenzolizing, which is in operation with satisfactory results. But this plant may as well be scrapped for all the use that we can make of it under the proposed new conditions. And, again, supposing that we could find men, and use the extra coal, the yield of tar from all that 25 or 30 p.ct. more would be inferior to our present production, which is at the rate of 14 gallons per ton, as against 10 gallons, the product of South Wales coal.

The coal-control scheme is excellent in its inception, and will result in improved and economical working; but if it is not tempered with a little elasticity, it may break with disastrous consequences to outlying communities.

HENRY WOODALL.

7, South Parade, Llandudno,
Aug. 17, 1917.

Re-issue of Debentures.—A Query.

SIR,—We have some terminable debentures falling due, and propose to renew them. There is some difference of opinion among the Directors—some saying that the old scrip must be cancelled and new issued in place, and others that the existing scrip can be endorsed as extended in time, and that new scrip would involve application for permission, as is necessary for new capital.

Could some of your readers kindly indicate the usual practice and also say if renewals are regarded as the same thing as *bonâ fide* additional capital?

PERPLEXED SECRETARY.

Aug. 13, 1917.

Mr. Curphey and Tar Dehydration Plants.

SIR,—In his report to the Local Government Board, the Chief Alkali Inspector questions, from a national standpoint, the advantage of gas-works dehydrating their own tar. Mr. Curphey bases his disapproval of this practice on—

(i.) Lack of skilled supervision.
(ii.) The working of faulty plants.

I hope Mr. Curphey's conclusions will not be taken too seriously by those managers who contemplate dehydrating their own tar, as apart altogether from the better financial return, there can be no doubt tar dehydration at gas-works is of great advantage to the community.

It is well known that crude tar may not be used on roads; so that the gas manager who has no dehydrating plant is bound to sell his tar to a distiller. The distiller then removes the water and light oils, and re-sells it for tarring roads which may be, and often are, in the same district as the gas-works which supplied the crude tar. The resulting waste of transport and labour need not be enlarged upon. It may also be pointed out that gas-works are good centres of distribution for road tar, whereas tar-works are usually found grouped together in limited areas.

The process of tar dehydration is one which is comparatively new to gas-works, and, under present conditions, skilled labour cannot well be obtained. But it is only fair to expect that "practice will make perfect," and that supervision will become more efficient with greater experience.

With reference to faulty plants, Mr. Curphey and his assistants render the greatest service to the worried gas manager by helping with their expert advice. But the blame should be laid on the manufacturers of these plants, who turn out a stereotyped apparatus to deal with tars which often differ widely from one another. At the same time, the difficulties which have arisen from the use of these plants have had a most valuable educating effect on gas managers. It cannot be denied that tar has too often been regarded as a nuisance to be disposed of as soon as possible. First-hand experience with the preliminary distillation of tar, backed-up by increased returns, is doing much to change this attitude.

Mr. Curphey concludes by saying: "Combined effort, with high efficiency through skilled control, will always beat individual effort with variable efficiency, and often devoid of specialized control." This is so inherently true, that the words "combined" and "individual" may be interchanged without impairing its universal application.

Aug. 17, 1917. B.Sc.

REGISTER OF PATENTS.

Charging Gas-Retorts.—No. 107,775.

WHITE, A. H.; a communication from the RITER-CONLEY MANUFACTURING COMPANY, of Leetsdale, Penn., U.S.A.

No. 5128; April 7, 1916.

The chief object of this invention is to reduce the time required for charging retorts and "ensure that the charges are rendered substantially uniform as to the amount of coal therein."

A charge delivery mechanism and retort-charging mechanism, according to this invention, are rendered active to deliver coal to the retort-charging mechanism and to charge it to the retort—the operations being relatively timed to complete the charge-separating action before the retort-charging mechanism reaches the charge-receiving position. The mechanism for supplying coal charges to the retort-charging mechanism comprises a charge-delivery receptacle supplied with a predetermined amount of coal by a charge-forming and conveying mechanism so as to be in condition for delivering a fresh charge to the retort-charging mechanism when it has returned to the charge-receiving position. In this manner, the time between successive chargings is considerably reduced, as the loss of time required to prepare the succeeding charge after the charging mechanism has returned is practically eliminated.

The cycle of operations of the machine is such that the completion of the charging operation automatically brings into action the discharge of the reserve charge into the retort-charging mechanism, and then automatically brings into action feeding mechanism, which automatically conveys the coal for the succeeding reserve charge to the charge-delivery receptacle—this feeding mechanism operating until the proper amount of coal is delivered to the receptacle, whereupon the feeding operation ceases and the conveying mechanism is (preferably, although not necessarily) reversed, so as to prevent coal from being added to the weighed charge or being otherwise dropped from the conveyor mechanism.

Economical plant operation is further ensured through the ability to provide the charges substantially uniform, by using weight as the controlling factor of the amount of coal contained in the charge—thereby "providing an assurance of the required amount of coal and preventing liability of an excessive quantity being used."

The patentees point out that, as is well known, coal does not run uniformly as to weight per cubic foot; also, that fine coal when damp is fluffy and light, and that the difference between dry fine coal and damp fine coal may amount to as much as 10 p.ct. Consequently, where the amount of coal in the charge is measured by volume, it is almost impossible to maintain uniformity. In addition, the measurement by volume necessitates maintaining excessive heats, since the heat required would be that necessary to carbonize the heavier charges, in which case the lighter charges would be overcarbonized; while if the heat were maintained to carbonize the lighter charges, the heavier charges would be under-carbonized.

By a lengthy specification of eleven pages of print, accompanied by four sheets of lettered drawings, the patentees proceed to deal with the details of the plant to carry out their idea.

Gas Purifying Mass from Iron Scrap and Bisulphate of Soda.—No. 107,807.

BECQUEVORT, P., of Folkestone, and DEGUIDE, C., of Pas de Calais, France.

No. 9747; July 11, 1916.

Nitre cake and scrap iron have been, the patentees point out, used as re-agents in the production of Glauber's salts—hydrogen being evolved during the reaction; and the objects of the present invention are to obtain hydrogen, Glauber's salts free from iron, and a mass of ferric hydrate and calcium sulphate directly available for use in the arts.

It is carried out as follows: Wooden tanks or tanks lined with lead are filled up with bisulphate of soda (SO_4NaH), which is watered in order to be dissolved up to a density of 20° Bé. The solution is added to scrap iron in a tank and heated to about 90° C. by steam injection. The following reaction is the result:

$$2NaHSO_4+Fe=Na_2SO_4+FeSO_4+H_2.$$

The hydrogen produced is washed in scrubbers and then stored in a holder. When the reaction is finished, the reaction tank is emptied and the solution of ferrous sulphate and sulphate of soda (bye-products

of the reaction) is led back into a lower tank. An excess of powdered lime is added to the mass in order to get the following reaction:

$$Na_2SO_4+FeSO_4+H_2O+CaO=Na_2SO_4+CaSO_4+FeH_2O_2.$$

A muddy mass of sulphate of lime and ferrous hydrate (FeH_2O_2), insoluble in the water, is produced, as well as neutral sulphate of soda unaltered by the addition of lime.

While ferrous hydrate is slightly soluble in the water—and this fact would affect the purity of the sulphate of soda when the latter is separated—it is preferable to transform ferrous hydrate into ferric hydrate. For this purpose the mass is aerated and shaken until the whole ferrous hydrate becomes ferric hydrate, according the following reaction:

$$2FeH_2O_2+H_2O+O=Fe_2H_6O_6.$$

This is made easier by the addition of water to the mass and by the injection of a sufficient quantity of air to transform the blackish muddy mass into a reddish mass—this colour being the sign of the end of the reaction. The mass is then filtered by a filter-press; and the liquid which flows away concentrated up to 30° Bé. (density when hot) and led to be crystallized. The solid salt obtained is Glauber's salt, $Na_2SO_4.10H_2O$; while the mass left in the press is a mixture of sulphate of lime and ferric hydrate. Wood sawdust is added in order to make the mass porous. It is then the well-known "Melange de Laming," $CaSO_4+Fe_2H_6O_6$, as utilized in gas-works for purifying the gas from sulphuretted hydrogen and hydro-cyanic acid.

Incandescent Gas-Mantles.—No. 107,874.

DAY, A., of Headingly, Leeds.

No. 13,153; Sept. 16, 1916. No. 17,167; Nov. 30, 1916.

The object of this invention is "to prevent the unnecessary escape of ignited gas and products of combustion at the top of the mantle, and for confining same as much as possible within its interior, and utilizing the gas and the products of combustion for increasing the incandescence and illuminating power of the mantle—at the same time reducing the consumption of gas."

The patentee claims to provide the burner or nozzle portion and the suspension rings used with incandescent mantles with one or more rings of horizontal projections or with one or more recessed flanges (in addition to the ordinary supporting lugs); each ring of projections or the flange having a number of spaces between them, or recesses formed in them. The recesses in one ring or flange are arranged under the lugs supporting the suspension ring and mantle, and when more than one ring of projections or a recessed flange is employed, then the spaces in each additional ring or flange are covered by projections in the succeeding ring or flange. He also combines in a nozzle for an incandescent burner the tubular portion of the nozzle with one ring of horizontal projections or a recessed flange formed on its outer periphery at a suitable distance from its lower end; the projections or the flange having a number of openings or recesses formed between or in them arranged under the recessed projections which support the mantle.

Distillation of Tar Oils and Like Substances. No. 108,004.

GRIMWADE, W. R., of Toorak, near Melbourne.

No. 9770; July 11, 1916.

By way of improving the quality of the pitch obtained from coal tar and facilitating the distillation of the anthracene, it has been proposed (the patentee mentions) to inject hydrocarbons into the tar during the distillation, and to break-up the hydrocarbon into small particles before it has reached the pitch, by means of inert gases—preferably free of oxygen. Absence of oxygen from the still has been recognized as an advantage in preventing discoloration of cresylic acids obtained in distilling blast-furnace tar or the products therefrom. But it does not appear to have been noticed that the objectionable odour of tar oils, carbolic acid, cresylic acid or the like produced by the distillation of coal tar, is due to the presence of oxygen in the still in which the oils or acids are distilled, and to temperature reactions set up during distillation. By this invention it is possible to avoid to a great extent the offensive odour by conducting the distillation in a non-oxidizing and inert gaseous medium—such as atmospheric nitrogen, carbon dioxide, or flue gases.

A practical method of employing the non-oxidizing medium consists in introducing it under pressure to the bottom of the still, and so that it flows in the same path through the condenser as the liquid undergoing distillation, and that the gas flow begins prior to the distillation process. The distillate is condensed in the ordinary way or the condenser delivery is fitted with an enclosed seal connecting with a reflux condenser. It is, however, to be understood, the inventor says, that the methods of condensation are not essential or part of the present process, which resides specifically in the distillation process, although a result of the process defined is to prevent the condensation of offensive smelling constituents of the tar or tar oils. To this end the still has one or more leading-in pipes for the non-oxidizing gas which terminate above the bottom of the still—the gas flowing upwardly and following the same path through the condenser as the liquid under distillation, so that distillation occurs in the current of inert gas.

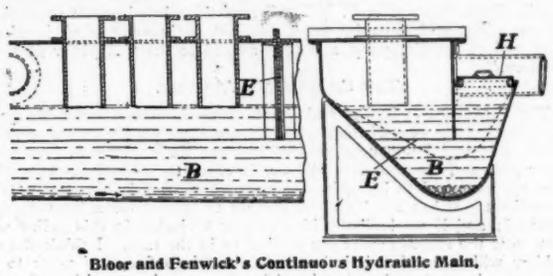
Hydraulic Mains for Gas-Retorts and Other Carbonizing Plant.—No. 108,049.

BLOOR, H. E., and FENWICK, J. B., of York.

No. 11,510; Aug. 15, 1916.

This invention consists in a method of utilizing a continuous hydraulic main as a tar off-take main also—thus dispensing with tar off-take pipes and separate tar-mains, and enabling the tar formed in any number of settings to be drawn off from the hydraulic main directly into the tar-tower. It is characterized by inclining the bottom of the hydraulic towards one end—a fall of 2½ in. per setting being found sufficient to cause the tar to draw effectually as produced. With this inclined form of main are also combined division plates between the settings, not extending to the bottom of the main, but sealing into the tar and liquor in it, "so that settings as a whole may be left uncharged, and so that gas cannot in any circumstances pass from the sections of the main which are in use to those which are out of commission."

The arrangement was described by Mr. Bloor in the course of a paper read before the North of England Gas Managers' Association last May [see "JOURNAL" for May 15, p. 296].



Bloor and Fenwick's Continuous Hydraulic Main.

The illustration shows a part longitudinal sectional elevation of part of a continuous inclined hydraulic main; also a cross-sectional elevation.

In order to permit of any one or more of the retort-settings remaining out of action while the others are working, the main B is provided with vertical division plates E forming a joint with the cover and sides of the main, but not extending to the bottom of the main—ample space being left for the flow of tar. The main may extend over the tar-tower where one is used; so that the tar draws directly into the tower. But if this arrangement be inconvenient, a short connecting pipe may be provided. In order to regulate the depth of liquor in the hydraulic, a weir valve is provided on the end of the main, and is operated in the usual manner. The main is preferably provided with loose side seal covers H or with otherwise open sides to facilitate inspection and cleaning.

The arrangement is said to combine the following advantages: No separate tar-mains or branches are required; regular flow of tar as produced; any setting or settings can remain idle; no stoppages of the ascension pipes; no clogging-up of the hydraulic main; the retention of a liquor seal to the dip-pipes; and the ready means of inspection of the hydraulic main without any interruption in the working of the plant.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Women Bricklayers at the South Metropolitan Gas-Works.

Mr. BECKETT asked the Minister of Labour whether he had received a complaint to the effect that the South Metropolitan Gas Company were employing women to do bricklayers' work; whether there were men over military age who were available to do this work and who were at present out of employment; and, if so, what action he proposed to take in the matter?

Mr. BRIDGEMAN replied that the Minister of Labour had received a complaint on this subject, and from information received he thought that the complaint as stated may be correct. He was communicating with the Company in the matter.

Sheffield Gas Company and Women Workers.

Mr. WILL THORNE asked the Minister of Munitions if he was aware that the Sheffield Gas Company (partially a controlled firm) were only paying the women workers 25s. 6d. per week for fifty-three hours, and whether he intended insisting upon the Company paying the woman workers in accordance with the circulars already sent out in the recent award that had been given to women for an extra 2s. 6d. per week on the present rates of pay.

Mr. KELLAWAY, in reply, said that no gas company in Sheffield was controlled. If the question referred to the Sheffield United Gas Light Company, this was a certified undertaking. Orders applying to certified undertakings the regulations as to women's wages which were in force in controlled establishments were now in preparation. They would include the Order prescribing the advance of 2s. 6d. per week, and would operate from Sept. 1.

The Ashton Chemical Works Explosion.

Mr. NEEDHAM asked the Minister of Munitions whether he had received claims for damage done to industrial property due to the explosion at Ashton-under-yne, and whether he would expedite the examination of such claims and the payment thereof.

Mr. KELLAWAY said a number of such claims had been received. The Ministry's Assessors were dealing as rapidly as possible with them, and over one-third had already been paid. The Ministry were not legally liable for these claims, but had assumed responsibility to make good any deficiency; and negotiations were pending with those primarily liable.

Electricity Undertakings and Rate-Aid.—In a second report issued by the Committee for the Inter-Connection of the Lancashire and Cheshire Electric Supply Systems, the opinion is expressed that the practice of making profits for the purpose of handing over substantial grants in aid of the local rates is detrimental to the interests of an adequate and economical supply of electricity.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the proprietors was held last Wednesday, at the Cannon Street Hotel—Mr. Charles Carpenter, D.Sc., in the chair.

The Secretary (Mr. F. M'Leod) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting. The seal of the Company was then affixed to the "Register of Proprietors."

The Chairman's Address.

The Chairman: Ladies and Gentlemen,—I assume you will, as is customary, take as read the report and accounts which have been duly circulated; and I will now proceed to move their adoption. As both the report and the accounts tell you, in order to balance our expenditure we have had to bring in surpluses accumulated from last year's operations. It has not been our custom to budget for a large carry-forward; and if we had any idea of any variation in this policy we have now the excess profits tax staring us in the face. I think shareholders will agree that it is better to cut things fine, and work to a close margin, rather than be placed in the anomalous position of paying to the Government, over and above the present heavy taxation, a large proportion of profits simultaneously with the shareholders receiving dividends considerably below pre-war figures. Yet this is exactly what would happen unless, by lowering the price of gas, we keep our profit within the margin allowed by the comparison year. So that we adopt the principle, with your support, of reducing the price of gas to give us something like pre-war figures. This, I think, is quite a legitimate and proper thing for us to do. It prevents the accumulation of funds which would doubtless help us in the future; but, on the other hand, it would be absurd to build up a large surplus of which we should have to pay a large proportion to the Government. So we cut our budget as fine as we can, in order to avoid having a surplus making each half year stand upon its own figures. The disadvantage of this is that you get a varying return upon your shares each half year. On the other hand, if the half year is favourable, you get an advantage, though at the same time you are free of having to pay excess profits tax; and considering that our dividend is reduced largely from what it was in pre-war times, I think that is the proper policy to follow. The man in the street would probably find it difficult to understand why gas companies should be excluded from the provisions of an Act regulating profits made as a result of the war; and if this were all the Act did, we should be the last to complain. I have in mind the instance of a large fuel-supplying company who charged so highly for their services that they were not only able to declare handsome dividends after paying the usual heavy taxation, but to make substantial provision for the future. An exception should certainly have been made in the case of statutory gas undertakings working under sliding-scales; for their dividends depend, not upon how dearly they can make the nation pay for its necessities, but upon how cheaply they can provide them. As regards the various bye-products of gas making required by the Government, it fixes its own prices for them; so that gas undertakings are automatically relieved of any temptation in the direction of profiteering—another name, I suppose, for taking advantage of the nation's need for the purpose of extra gain. While speaking of profits, I ought to remind you of a circumstance noted in the second paragraph of the report, the significance of which might easily escape notice. It is that the price of gas has been raised to 3s. 1d. per 1000 c.ft. Now this is the standard price of gas, at which figure we are entitled to pay 4 p.ct. upon our ordinary stock; so that the dividend for the current half year will be at that reduced figure. There is every reason to think we shall get through to the termination of the war at no lower rate, in which case I think we shall have cause for congratulations, despite the very obvious hardships the fall in interest entails.

Labour and Raw Materials.

Our main expenses are, of course, for labour and raw materials. If further increase in the cost of living is checked, and even reduced, as one is entitled to hope will now be the case, labour should be content with its present remuneration; and a maximum price having been fixed for coal, we should have reached the peak in our costs with present prices. As long as this continues to be the case, I do not see how we could expect relief from Parliament while the war rages.

Sliding-Scale Revision.

I mention this because there is a fairly widespread conviction that the existing sliding-scale basis of apportioning charges and profits has broken down. It was certainly never made for war-time conditions. It was designed primarily as an inducement to gas undertakings to carry on their businesses with good care and management, by the possibility thereby of dividing increased profits; but it was never contemplated that our raw material—coal—would treble in cost. When we last went to Parliament in 1900 and settled the present sliding-scale, the standard price was 3s. 1d. per 1000 c.ft. and coal was being delivered in our works at about 10s. 6d. per ton, while the present price is something nearer 30s.—sometimes more and sometimes less, but practically we are working under a sliding-scale which was fixed at a time when all our important raw materials were delivered at the works at something like a third of present prices. It is obvious that a complete revision of our sliding-scale must be made to suit altered conditions; but as future prices both of labour and raw material are so uncertain I cannot think that in the midst of war would be an opportune time unless the unlikely happens, and working costs become seriously higher. In this connection, we must not forget that, in common with other coal-users, we owe something to the fixing of a maximum price. If the price of coal had been allowed to get as out of hand as was that of freight, the consequences would have been serious in the extreme, and we must bear this in mind when we think of the sliding-scale trouble. The other dominant factor is, as I have stated, the remuneration of our employees. The cost of war allowances to those fighting for our country and for those left behind to carry on, have, as the report tells you, been at the rate of over 4d. per 1000 c.ft. of gas—at the present time, they are, in fact, about 5d. I cannot think either you or the consumers will grudge this contribution, heavy though it undoubtedly is. We have dealt fairly with our workpeople—neither with a niggardly nor extravagant hand; and I am sure they are appreciative of the sacrifices made on their behalf, as we are of the devotion they show to their employers under very trying circumstances. We are in a very different position to most of the large industrial associations of the country whose employees are making large wages. We cannot compete with those; and our employees are suffering in many cases. In some adjacent factories engaged in munition work, owing to the high rate of wages paid, the cost of food is high. It can be well paid, however, by those earning high wages; but the employees of gas companies are in comparison handicapped in purchasing the necessaries of life. How to get over this, I do not know. Therefore, I say we are appreciative of the loyalty of our staff in circumstances of very great difficulty.

Coal Stocks.

Another heavy item of expenditure referred to in the same paragraph of the report is that of interest—that is, other than on debenture stock. You will not be surprised at this if you look at our large indebtedness to our bankers. This, as I have before stated, arises from the fact that materials are so much dearer, that we require a greater floating balance to deal with them. Coal is the outstanding instance. The Controller tells us we must take in greatly increased stocks; and we have done, and are doing, so. We have had quite a reversal of the usual practice—we have had to increase stocks in the summer instead of letting them run down. No man can hesitate for a single moment in expressing an opinion as to the importance of the matter; for it would be futile to rely on getting coal in the winter when the days are shorter, so we must get it in during the summer. And the coal and other materials have to be paid for. We are paying for the coal week by week, though we shall not until next spring receive back the cost through the gas accounts. I walked round one of our large stacks the other day; it was over three-quarters of a mile in circumference. The correctness of the policy of holding such large stocks is undoubted.

An Issue of Temporary Capital.

This state of things arises, of course, entirely out of war conditions; and it is in order to meet them that we are issuing what may be called temporary capital, to enable us to carry on under these exceptional conditions without being saddled afterwards with surplus of capital and constituting a permanent charge for interest. In order to provide for these special difficulties, we came before you at the last summer meeting and asked your consent for raising extra capital. It is obvious we cannot go on with heavy loans from our bankers; and we therefore decided to obtain further capital powers. We have recently decided to issue £250,000 of 5 p.ct. stock, at 94. The practice with regard to the issue of stock in war times is not the same as in times of peace; and after taking advice, this is the figure at which we decided to issue. You will see by the papers to-morrow the announcement that the stock is on the market. It will be redeemable stock, as we do not wish to have an exceptional amount of stock hanging round our neck when things become normal. I ought to mention, with regard to the debentures (as they are referred to in the report) that it is proposed to raise temporary capital to the extent of £750,000. Of this, £500,000 is in respect of debentures; but we do not propose to make a public issue of these—that will be a matter of arrangement between ourselves and our bankers.

A Remarkable Increase in Gas Sales.

I have dealt, I hope, adequately with the more sombre features of the accounts. There is fortunately an excellent silver lining to the clouds upon our working. First I must mention the remarkable increase in the sales of gas, which, as the report tells you, have exceeded 12 p.ct. I think this is a unique experience in the Company's history; and it says much for our officials and their organization that they have been able to cope with it in circumstances of great difficulty. This expansion of the demand, arising partly from industrial needs, very forcibly brings home to us what the authorities are now awakening to—namely, that gas companies have ceased to be purely a public necessity, and have become a national one. The nation must entrust them to a greater extent than ever before with the utilization of our coal resources. It has begun to realize that the one industry which holds the position of pre-eminence in this respect is that devoted to the scientific carbonization of coal and the distribution of the products therefrom—liquid, solid, and gaseous. It needed the war to stamp this fact upon the official mind; and the imprint is not likely ever again to become blurred.

The Gas Industry and "Reconstruction."

Gas undertakings must have an important share in reconstruction after the war. The official request to use gas wherever possible is not likely soon to be discontinued or forgotten. The nation has got to shoulder many responsibilities it ignored or evaded in the past. It must deal with the smoke question upon broad and comprehensive lines; and I am glad to know it is one of the problems engaging the earnest consideration of the Fuel Board connected with the recently-formed Department of Scientific and Industrial Research. I have every reason to believe that this Company will be associated with the experiments called for in the inquiry. As gas makers we have in the past sacrificed, perhaps, too much in an endeavour to obtain the highest yield of our chief product, gas. So long as the Government took no interest in encouraging the nation to become self-supporting, and appeared to rejoice in the import of necessities, there was no possibility of our following another policy. Why should the country have imported enormous quantities of oil for the purpose of making gas to light and heat our towns and cities, while at the same time we were exporting enormous quantities of raw coal, much of which would be used against us by our industrial competitors? We can greatly increase our own liquid fuel supplies, whether for use under boilers or in motor engines, if to do so is made part of a broad comprehensive scheme of national policy.

At the present time we can take no other course than to follow the dictates of the Government, who are responsible for carrying on the war. But upon its completion, we shall certainly require to have a voice and to take a part in what is euphemistically called "Reconstruction," but which is only another expression for taking to heart and utilizing the lessons taught us by the war.

THE COMPANY'S CARRYING FLEET.

As an undertaking I am free to confess we have shared in the general awakening. The most practical instance I can give is that of coal transport, where the possession of our own colliers has proved a very great advantage and security. I hope there will be no difficulty in the way of our handling the whole of our requirements with respect to fuel. There will be this collateral advantage—that in the summer time we shall be able to employ some of our steamers in transporting to foreign countries our bye-products. We are entitled to look forward to the time when we shall export as a nation not so much raw coal as the products of coal; and our fleet of steamers will be available in the summer months for dealing with this class of business.

A TRIBUTE TO LABOUR.—THE WOMEN WORKERS.

Lastly, but not of least importance, I must say a word on behalf of the Company's staff and employees of all ranks. One half of our pre-war complement are now serving in His Majesty's Forces; their places having been taken by male and female substitutes in about equal proportion. All have thrown themselves into their new tasks with courage and earnestness; and if I single out for special commendation the female workers, it is because their changed environment has been so radical in its character. You all know of what a special nature is the work carried on in the retort-houses in the process of machine gas-stoking. This work is to-day being carried out in a portion of one of our large works entirely by female labour. And it is not only being carried out, but efficiently so. It has been to me one of the practical revelations of the part women can play if the emergency arises—there may be Amazons not only on the battlefield, but upon the more prosaic grounds occupied by our industrial manufactories. They have been an enormous help to us in our present difficulties; and I am glad to have this opportunity of paying tribute to their zeal and earnestness, as well as to those who have so patiently and so disinterestedly taught and coached them in their many novel tasks. There are many kinds of employment in which females are doing useful work, such as the repair of meters, stoves, and altering prepayment meters. At the present time, to our coin meters, which have an attachment so that when you put a coin in you get out a certain quantity of gas, we have had to send round and adjust the mechanism so as to alter the amount of gas which the penny would provide. All this work has been successfully done by female labour. There is no limit to what can be done in many ways which no one could have realized before the war.

I think I have dealt with all the matters covered by the report; and I beg formally to move—"That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The DEPUTY-CHAIRMAN (Mr. Frank H. Jones) seconded the resolution.

The CHAIRMAN: The matter is now open for discussion.

SHAREHOLDERS' REMARKS.

Mr. PRICE said there were one or two items in the balance-sheet as to which he should like some explanation. The first was expenditure on new buildings and machinery £86,420, which seemed somewhat excessive. The next item was "interest on temporary loans and deposits £25,409," which came to about £1000 each week. This amount had increased year by year. In 6, 7, and 8 there were large sums "to be invested;" and he should like to know where the money was. If not in the bank, it must be in the business; and he considered the money should be invested outside the business, so that, in case of accident, it could be at once realized. Then in regard to "War Loan, £237,500"—was this the actual value or the face value? He recollected the time when the shares were issued at 132 and 128, though the highest he paid was 120; and it was not very pleasant to see the stock quoted at the present price. The Chairman might say they were all in the same boat; but he did not like to see £750,000 being issued at 94. He should like to know when the new stock would be redeemed; and what rate of interest it would bear. Every year the bank indebtedness appeared to be increasing; and if the £750,000 was to pay this off, that was increasing the capital. He hoped the shareholders would protest against the loans being increased.

Mr. A. M. PADDON said he could not agree with the last speaker, as he thought that if the Directors had not contracted the loan, they would have acted in defiance of every sound principle of finance. The business of the Company had increased by 12 p.ct.; and if this were worked out in millions, it would be seen that the loan would very little more than provide the financial means of conducting the increased business. If the Directors had not contracted the loan, what course would have been open to them? They could not have gone to the public for the money. He was firmly convinced that it was better to borrow. It was self-evidence of sound finance that the Directors had done what they had done. If they had not done this, they would have dissociated themselves from every sound precedent of gas administration in the past. With regard to the question of the standard price in relation to the sliding-scale, which was a most important subject, the question merited every word that the Chairman had devoted to it—in fact, he had left nothing for anyone else to say. But there remained in connection with it just one issue which might be qualified by a very slight difference of opinion. It was a question as to whether the readjustment of the sliding-scale should stand over *sine die*, until the end of the war; and as to when that would be, he did not know. Before the question could be readjusted they would have to convince Parliament (or some authority constituted by Parliament) as to the soundness of the application. A concrete hardship was a great deal easier to argue than an abstract grievance: and when the war was over the immediate causes of the difficulty under which they laboured might have disappeared, and the Government might say, "Time will constitute your cure." After the war had ceased it was not gas companies alone who would have to apply to Parliament for a revision of the conditions under which they carried on business; and there might be such a congestion of urgent matters to be considered that gas companies might not get the full and deliberate treatment the matter merited. The Company might well look at the question from its own point of view, because the sliding-scale had its genesis in the South Metropolitan Company. But there was this to be said, that most of the great gas companies in the country were involved in its practice, and not one would be heard in Parliament until the claims of the South Metropolitan Company and its larger neighbour had been considered. He might be forgiven for being a little anxious in hoping that the question would be taken up in Parliament at an early date; and if the Chairman could anticipate that date, with his considerable influence with Parliament, he would be bringing a great measure of relief to those who found the sliding-scale in these times almost intolerable in its application. In conclusion, he congratulated the Directors upon their admirable management, as they were able to declare a dividend 30 p.ct. in excess of their great neighbour. Another thing they were to be congratulated upon was the fact that they were to be selected for Governmental experiment.

Mr. HAVELOCK WEST said he would like to know how many boats the Company possessed, and whether any loss had been sustained through the war. Considering that freight had increased from 3s. to 20s., he thought the sliding-scale had created a great injustice to them, as they had not been able to benefit, like many profiteers, by the rise in price of everything. He hoped that as soon as the war was over, something would be done in the matter of the sliding-scale, as it did not work at all well. With regard to the large stocks of coal, he hoped that every protection would be taken against spontaneous combustion. He was very pleased to hear that the female staff were doing such remarkably good work; and he hoped that after the war was over the Company would be able to continue to employ some of them.

The CHAIRMAN: If no one else has any remarks to make, I will do my best to reply to the various speakers, dealing with the last one first. With regard to the employment of women, there was no doubt they had come to stay, though to what extent it was impossible to prophesy. With regard to the spontaneous combustion of coal, this was a matter which had for many years past engaged the attention of all authorities who had to stack coal—not only here but on the Continent and in America; and it was found that the only absolute remedy was to have the coal-stores wholly enclosed, so that the store might be filled with water. This was impracticable when dealing with coal at their stores. The Admiralty had made many experiments in reference to the matter, and many means had been suggested with regard to obviating the danger. At one time, the Company were considerably troubled with regard to spontaneous combustion; but to-day they have no fear about it whatever. It is simply a question of using a large quantity of water. During the half year, we have lost ships; but we are providing others, either by purchasing on the market or by having new ones laid down. As to the issue of the new stock, the Board have taken the responsibility of fixing the issue price at 94; and if the stock is taken up at this figure, it will show that the Board was right and that Mr. Havelock West was wrong. At any rate, the responsibility is ours; and we have every reason to believe the stock will fetch the price which has been fixed. I need not say that we shall welcome any applications from shareholders of the Company. In reply to the speaker who dealt with the sliding scale, I may say that I admit the hardships; but it is not a bit of good to blame the Board for them. The conditions were settled in peace time; and everybody thought it was a good thing and that gas shareholders would profit by it. Under war times, it is out of date; and we think Parliament would be sympathetic in getting it altered. The Government have controlled railways, and their dividends; and it is said why should they not do the same for gas companies? There was a very good reason why they should not. In the case of railway companies the matter was of importance, in order to utilize the whole of the rolling stock for the purposes of the country. It has enabled a very considerable portion of the track to be pulled up and sent over to France; and it has also released a large number of locomotives and rolling stock, which have been transferred to France. It has further enabled a reduction to be made in the number of trains running to the same place on parallel lines. Why should the Government take over the gas companies? It would be simply to maintain their dividends; and I cannot imagine their doing so. The Board are fully alive to the hardness of the sliding-scale, where the stock is held by those least able to bear the loss through reduction of dividend. All we can do is to wait with our eyes open; and when the Board see it is possible to make a move, they will do so. One speaker referred to the capital account and the amount of the loans. But there is this important thing to bear in mind with regard to this question. If you take the accounts for the last ten years, you will find that the capital has not increased at the same rate as the business. The business to-day is done at a less expenditure of capital than in the past; but you cannot run an increasing business unless you have the capital to do it with. One might say the alternative was to refuse to do the work. But we can only go on as consumers make demands upon us; and it is impossible to supply an increased quantity of gas unless we have the means. Now as to "Capital Account, No. 3." The expenditure on new building was necessary for our business. We cannot do the business we have to do unless we provide the necessary capital. There is a temporary loan of £815,000. Our business was built-up on a capital requiring payment for coal at the rate of 6s. or 7s. per ton free on board, with 3s. per ton for freight. This roughly gave a rate of 10s. per ton. But the raw material now costs 30s. per ton. There was nearly a million pounds worth of stores on hand. So long as you are dealing with raw materias, and their manufactured products largely increasing in value, you must have a large amount of capital to deal with it. You have to issue new capital or borrow money; and no one who has had any experience of financial undertakings could come to any other conclusion than that the decision of the Board not to increase the permanent capital, but to make the best temporary arrangement possible, so as to carry us over difficult times, was the right one. ["Hear, hear."] We have done the only possible thing to carry out

this policy. [Cheers.] No one welcomes more than I do criticisms on our working, as it shows that people take an interest in our affairs, and I can assure you we have nothing to hide. In this particular case no suggestion was made that we should stop our business—which of course we cannot do—and if we are to continue it, we must provide the necessary means to carry it on. [Applause.] With regard to the investment of the various funds, I think that in times like these we are justified in using everything that will help us to meet such exceptional conditions.

The resolution was put and carried.

The Dividend.

The Chairman: I have to propose:

> "That a dividend at the rate of £4 13s. 4d. p.c. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post."

Mr. John Mews seconded the motion, which was put and carried.

The Chairman: Ladies and gentlemen, that is all the business.

Votes of Thanks.

Mr. Price had much pleasure in moving a vote of thanks to the Chairman for his admirable address and for the lucid way in which he had answered the various questions that had been put.

Mr. Havelock West seconded the motion, which was carried unanimously.

The Chairman: I thank you very heartily indeed for your kind vote. I believe I deserve it more to-day than at any other period of my association with the Company. It has been a trying and a difficult time for us; but I think the future of the Company is absolutely bound-up with my own. In conclusion I would like to take the opportunity of proposing a vote of thanks to the officials and the staff for the admirable manner in which they have carried on the business in anxious circumstances.

Mr. Price had much pleasure in seconding the motion, which was put and carried unanimously.

Mr. G. M. Gill, on behalf of the engineering staff and workmen, thanked the proprietors for their kindly references to them. He had only been connected with the Company for eighteen months; but he had been greatly impressed by the loyalty shown by the workmen. It was a great pleasure to be brought into contact with such men. The increase of 12 p.ct. in the sale of gas was equal to an amount that would supply a town like Cardiff; and it meant carbonizing 60,000 tons of coal. The increased production of sulphate of ammonia thereby was of great importance from an agricultural point of view.

Mr. F. M'Leod, on behalf of the clerical and commercial departments, said he appreciated very much this kind vote of thanks. The depletion of the staff had been felt most acutely. The assistance rendered by the women was of great value; and he looked with every confidence to the future—feeling sure that, when they next met, the outlook would be more rosy than it was now.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. Bradshaw in the chair.

The Secretary (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

Considering Annual Meetings.

The Chairman, in moving the adoption of the report and accounts, said: I always feel that we ought to apologize for bringing you here to a general meeting of the Company in the middle of August, which to most people is the holiday month; and I think that we are all coming to the conclusion that half-yearly meetings are out of date, and are really not as useful as are annual meetings, because a comparison of a whole year's accounts, &c., with those of the previous year gives a much clearer view of the position and progress of the Company than is afforded by a more frequent comparison. Half-yearly meetings were considered necessary in the early days of joint-stock enterprise, in order, I think, to keep the control in the shareholders' hands, and to maintain a close connection between them and the Directors. But experience has shown that the shareholders get a better knowledge of the Company's affairs by yearly meetings; and many important companies, including all the great banks, pay an interim dividend at the half year, render yearly accounts, and meet the shareholders annually. I say this because it may be wise, when next we go to Parliament, to obtain powers to modify the present obligation to hold half-yearly meetings; and I put that forward for your consideration.

Heavy Increase of Cost, but Extension of Business at Higher Prices.

The outstanding feature of the accounts which we present to you to-day is the continuance of the increase in the cost of labour and raw materials which has been taking place ever since the commencement of the war. Evidence of this is found in the fact that, while our sales of gas have grown since the last pre-war half year by 13¼ p.ct., the expenditure on revenue account has increased by no less than 53·8 p.ct. The weekly bonus paid to our workers to meet the extra cost of living has grown from 5s. to 10s., and from 10s. to 15s. The cost of coal into the works, which for the first half of the year of 1914 was 17s. 9d. per ton, has increased to 28s. 6d. per ton for the last half year. Oil, which in 1914 cost us approximately 3d. per gallon, is now nearly 1s. per gallon; while necessary repairs and extensions to plant are almost proportionally expensive. Of course, the return from residual products has expanded; but we have had to increase the price of gas first from 2s. 4d. to 2s. 8d., then to 3s., and now, since the 1st of July, we are charging 3s. 2d. per 1000 c.ft. It is unfortunately impossible to say that we shall not have to raise the price still further. You will, however, be glad to know that, in spite of the increased price, the sales of gas for the half year under review show an increase of no less than 8 p.ct., which is the largest increase this Company has ever experienced. I believe the Gas Light and Coke Company had an increase of 10 p.ct.; and the South Metropolitan Company one of 12 p.ct.

Overdrawn Capital and the Cause.

The next feature of the accounts which will strike you is that the capital account is now overdrawn by £140,630. You will see that last half year we spent £57,034, which is, of course, far more than we have ever had to expend in one half year before. In the winter of last year, our ships were so much delayed by bad weather and submarine threats that our coal stocks were dangerously depleted, and for more than two months in the depth of winter we had a very anxious time indeed. It would not have been right to run the risk of a similar experience next winter, and the only remedy was to purchase more ships. This we have done by buying two ships of an aggregate carrying capacity of nearly 2000 tons. The Company's fleet now consists of eight ships—we think ample for all requirements under almost any conditions. When at last the war is over, and our ships sail under normal conditions,-we anticipate that we shall be able to sell some of them, and probably at very good prices; but while it lasts the increased number of ships is a necessary provision for the safety of the Company. You will see we have also had to spend considerable sums on capital account to provide plant for Government requirements in toluol, benzol, and concentrated ammonia. Then you will observe at the end of the balance-sheet that we had a loan from our bankers at the end of June of £210,000. The large amount of the loan is due, first, to the overdraft on our capital account; secondly, to the large stocks of coal, oil, and other materials which considerations of security compel us to maintain; thirdly, the high prices at which these stocks necessarily stand in our books—stores in hand figuring at £162,847, compared with £82,843 this time last year, and a normal amount is somewhere about £70,000 to £80,000; and, fourthly, to the unusually heavy amount due to the Company for gas and residuals, the sum due this year being £145,000, while last year it was only £98,000. This large bank loan, which is more likely under the present conditions to increase than to grow less, naturally points to the need of further capital. But, although we have capital powers unexhausted to the extent of £228,000, it would entail a very heavy permanent burden on the concern if we were to issue either ordinary stock or debenture stock at the prices which prevail now; and it may be thought wise to ask Parliament to give us power to issue capital stock or loan stock redeemable in a certain number of years, and in this way to meet the emergency caused by the war without putting a permanent burden upon the concern. You will have seen that steps have already been taken by the South Metropolitan Gas Company. They went to Parliament for powers last year, and are now putting into force the powers then received.

The Increase in the Sale of Gas.

The large increase in the sale of gas to which I alluded, representing 8 p.ct., or 142½ million c.ft., has been brought about principally by these causes: First by the heavy demand for gas for the manufacture of munitions and for other industrial purposes; secondly, by the substitution of gas for solid fuel for domestic uses; and, thirdly, by the severe weather experienced in the early months of the year. In recent years in our district, increased sales of gas have taken place almost exclusively through prepayment meters; but there was an increase in the half year under review of 11·15 p.ct. through ordinary meters, and only 2·66 per cent. through prepayment meters. Undoubtedly the supply of gaseous fuel has been a great boon to manufacturers and traders, as well as to the poorer classes of the residents in our district, at a time when, owing to the difficulty of transporting it to London, coal was so scarce and so dear. I think we may confidently expect that, when peace conditions enable us once more to cheapen the supply, we shall be able to retain a large portion of the increased trade which the war has brought to us. The country, I believe, is slowly awaking to the fact that the use of gas, which preserves to the nation the valuable products contained in coal tar, must be encouraged in peace times as well as war times if we are to compete successfully with foreign trade rivals; and steps must be taken to discourage and bring to an end the wasteful consumption of coal in open grates. At the present time, the Government are urging gas companies to use every effort to increase the manufacture of rich tar in order to maintain the supply of high explosives; and I need not tell you we are straining every nerve to comply with the demand. We are also aiding in the prosecution of the war by smelting metals for shell fuses by means of our patent gas-furnaces, which we are told by Government officials fuse the metals more satisfactorily than any other form of furnace. You may rest assured that all that we can do to help the country at this time of crisis will be done willingly by our officers and employees. It is interesting to note that for the first time we made over 2000 million c.ft. of gas in a half year. I notice on looking at my book of statistics, that it was in the second half of the year 1888 that the Company first manufactured 1000 million c.ft. This is of special interest to me; for I became a Director that half year, and consequently I have seen the Company double its output in the 29 years during which I have been officially connected with it.

More Information as to Costs of Materials.

I drew your attention just now to the enormous increase in the cost of our raw materials; and I think that some further explanation is necessary to enable you to understand the position. Coals, which (as I pointed out) in the first half of 1914 cost 17s. 9d. into the works, cost in 1917 28s. 6d., which is an increase of 61¼ p.ct. But while the price of coal f.o.b. in the North has advanced in the three years by 3s. 2d. per ton, which represents 23 p.ct. on the 1914 price, the cost of freight has increased by no less than 7s. 8½d. per ton, which is 190 p.ct. A very large part of the extra cost of freight is due to the very high premiums which have to be paid for insurance against marine and war risks. In pre-war days the cost of marine insurance was less than £3000 for the half year. In the half year under consideration, the cost of insurance, including war risks, was over £30,000; and in the current half year we estimate that it will exceed £50,000, which represents 6¼d. per 1000 c.ft. on the price of gas. This is not all; for a

very large part of the increase in the price of oil is due to the additional cost of freight and insurance. You will see that we have practically no option in the matter, and that it is not likely that there will be any relief until peace is declared. The inevitable delays which occur to shipping in war time, of course, add to the cost; but while the running of our ships was very bad in the first three months of the year, when our stocks of coal were low, and the demand for gas unusually heavy, I am glad to say there has been a marked improvement during the last three months.

CHANGES IN THE REVENUE ACCOUNT.

Now, turning to the revenue account, I will briefly point out the changes which have taken place in different items comparing them with the corresponding half of 1916. The income from gas is £253,062, compared with £226,336 in 1916—an increase of £26,726, which is due partly to additional sales, and partly to the fact that during the second quarter of the year (in which, being a summer quarter, a smaller quantity of gas is sold) we were charging 3s., instead of 2s. 8d., per 1000 c.ft. The rental from meters and stoves was more by £1432, and residuals show a gain of £20,538; so our total income was more by £48,696. On the other side of the account, coals and oil cost more by £59,699, manufacture more by £4119, distribution more by £3099, and management more by £1914, and other expenses were more on balance by £6283—making a total increase in expenditure of £75,114; so that the balance of profit (which was £41,732 in 1917, and £68,151 in 1916) was less by £26,418. In the expenditure is included a charge of £22,495 for war bonus paid during the half year, and a sum of £3572 allowances to employees on active service—a total of £26,067, whereas in the corresponding half of last year, these charges only amounted to £12,067.

THE FINANCIAL RESULT, AND THE EFFECTS OF THE INCREASED PRICE.

The net result of the half-year's work is shown in the net revenue account, and stated briefly is as follows: At the beginning of the half year, there was brought forward a sum of undivided profit amounting to £75,867. Adding the balance of profit £41,732, and deducting the interest on debenture stock and the temporary loan, together amounting to £12,754, leaves £104,845 available for dividend. The dividend at the rate of £4 8s. p.ct. on the 4 p.ct stock (which is 10s. 8d. p.ct. less than last year owing to the increase of 4d. per 1000 c.ft. in the price of gas), and 4 p.ct. on the 3½ p.ct. stock (which is 13s. 4d. p.ct. less) amounts to £44,492; leaving £60,353 to be carried forward to the current half year. Briefly, we have earned £15,513 less than the dividend which we recommend. Since the war began, we have reduced our undivided profit by £19,216. We realize that it is now necessary so to adjust the price of gas that the Company shall earn its statutory dividend, which is a very moderate one indeed. The consumers, shareholders, and employees, who are profit-sharers, are partners in the concern; and all alike have suffered owing to the heavy burden which the war has placed upon the Company. The consumers have had the price raised by 10d.—the charge for gas being 3s. 2d. since July 1; the shareholders have had their dividends reduced; and the employees have seen their profit-sharing bonus almost approach vanishing-point. It was 6 p.ct. on their wages before the war; last half year it was only 3 p.ct. on an average price of 2s. 10d.; and now it is only 1 p.ct.—the price of gas being 3s. 2d. Of course, I should point out that all the employees, except those receiving the higher salaries, have received the war bonus; but that bonus was given to meet the extra cost of food and clothing, while the profit-sharing bonus was given as a reward for, and an incentive to, zealous work.

THE EMPLOYEES AT HOME, AND THE MEN AT THE FRONT.

I cannot conclude my remarks without mentioning to you the good and faithful service which we have received from all ranks and classes of the Company's employees. The Company's marine staff—the crews of our ships—have persevered in bringing our supplies of coal in the face of numberless dangers from mines and submarines; and we owe them a very heavy debt of gratitude for their courage and hardihood. The girls and women, who have taken the place of the men serving in the army, have zealously and bravely undertaken work which in pre-war days we should have deemed to be impossible for them. The men who are exempt from military service, by age or some other infirmity, have laboured indefatigably to get the work done under difficult circumstances, so that the Company should not suffer by reason of the staff being depleted. In fact, all the work of the Company has been done by all loyally, faithfully, and willingly. I regret to say that nine of our staff have lost their lives during the half year, bringing up the death roll to 22 out of a total number of 342 men serving in His Majesty's forces. Who can estimate the debt that we owe to those who are nobly offering their lives for us, for their King and for their country, and for the cause of liberty and right? We are sometimes inclined to repine at the troubles which the war has brought upon us; if so, let us compare them with the sacrifice which those have made who have offered up their lives for us.

PREPARATION AND WILLING WORKERS.

Now, for the current half year doubtless there are difficulties before us; but I can say that we are in a better position to meet them than we were last year. Our stocks of coal and oil are largely increased; our fleet of ships has been considerably augmented, and should be ample for our requirements; and, so far as I see, we ought to be able to meet every demand made upon us. At any rate, I can assure you that you can rely upon all in the Company's service doing their best work to secure its continued prosperity.

The DEPUTY-CHAIRMAN (Mr. H. E. Jones), in seconding, said the proprietors had heard from the Chairman a full and lucid account of the Company's proceedings, and they must be convinced how grave and serious had been the burdens upon the whole staff, and among others upon the Directors.

Mr. S. M. WOOD remarked that in the balance-sheet, under accounts due to the Company, was an item "Sundries £40,577."

The CHAIRMAN said he thought somebody would notice that, and he ought to have explained it. The amount was very high; and a large part of it was due to the fact that their insurances for ships were paid in advance. They insured the ships ahead, and took credit for this in the balance-sheet. Some £7000 was also included for munitions, fittings, and stoves; but it was all good money.

Mr. WOOD also inquired where the amount appeared that was received from the Government.

The CHAIRMAN: Under the head of residual products.

Mr. W. GROVES thanked the Chairman for the lucidity of his statement, for the gracious reference to the men and women who were doing the work at home, and for his sympathetic allusion to those who had laid down their lives, and to those who were working in the interests of not only the country, but the Company, out at the front. The proprietors were glad to hear that, in spite of the increase in the price of gas, the consumption had gone up considerably, which evidently showed that gas was a thing that could not be done without. He was glad to hear the Company had an efficient fleet of eight vessels; but he should like to know whether there was any guarantee that the Government would not commandeer them. Was there any arrangement that gas companies' vessels should be exempt? Another point was the quantity of gas unaccounted for—168,576,000 c.ft., approaching 8 p.ct. of the total production. What was the probable cause of this?

The CHAIRMAN replied that they had no guarantee whatever that the Government would not requisition their ships; but the Government were fully alive to the necessity of keeping gas companies well supplied with coal. This was one reason why they would not requisition their ships. Another reason was that the Company's ships were small, because they had to run to their wharves, and so were not suitable for Government requirements. In this their safety lay. The amount of the unaccounted-for gas was a little higher—158,000,000 c.ft., against 152,000,000 c.ft. He could not say what the cause of this little increase was. It was probably climatic to a large extent. He had been discussing the matter with their Engineer and General Manager (Mr. Stanley H. Jones); and he had his finger upon it.

The motion was unanimously carried.

DIVIDENDS.

Proposed by the CHAIRMAN, and seconded by Sir FREDERICK GREEN, a dividend was declared for the half year at the statutory rates per annum of £4 8s. p.ct. upon the 4 p.ct. stock, and 4 p.ct. upon the 3½ p.ct. stock, both less income-tax.

THE SECRETARY'S REMUNERATION.

The CHAIRMAN next proposed a resolution empowering the Directors to increase the remuneration of the Secretary, by an amount not exceeding £500 per annum, in such instalments as they may from time to time determine. There was, he said, an Act passed over seventy years ago called the Companies' Clauses Consolidation Act, 1845. That was in the early days of joint-stock enterprise; and there was a section in the Act which provided that the choice and removal of the Directors and Auditors, and the determination of the remuneration of the Directors, Auditors, Treasurer, and Secretary, should be exercised only at a general meeting of the Company. In those early days, it was probably thought that the Secretary was the chief executive officer, and that, by keeping the control of his salary in the shareholders' hands, the control of the concern would be kept in his hands also. Their chief executive officer to-day was the Engineer and General Manager; but Mr. Bradfield came a very good second. So it was they could not increase his salary without coming to the proprietors, and getting their authority. Mr. Bradfield joined the Company in 1901, when he became Accountant; and in the year 1911, when Mr. Ellis retired, and became their valued and valuable colleague on the Board, Mr. Bradfield was asked to also undertake the duties of Secretary. Since he joined the Company, the size and work of the undertaking had largely increased; and the duties of the Secretary had enormously grown. The Chairman proceeded to enlarge upon the work associated with the National Health Insurance, and the employees' benefit societies, which the Secretary took in hand. Then there was the work associated with the grant of badges, protection certificates, and so on. There was a return for income tax to be made for 1400 workpeople, which entailed an enormous amount of detail work, and a comprehension of the Income-Tax Acts. With all this heavy additional responsibility, Mr. Bradfield's duties were admirably performed in every way; and better done they could not be. The prompt manner in which the accounts were issued showed the ability, energy, and efficiency which was brought to bear upon his work. The amount for which the Directors now asked authority to increase his salary from time to time would with his present salary be much less than the former combined salary of the Secretary and Accountant.

The DEPUTY-CHAIRMAN, in seconding the motion, remarked that he, first as an officer and now as a Director, had had long acquaintance with Mr. Bradfield. He was a conspicuously competent Accountant; and he placed before the Directors and other friends the most complete analysis of the working of this and other undertakings of similar character which could possibly be prepared. To a Company like this, in such times, and among such rapids and rocks as they were steering through, there was an incomparable advantage in having these statistics at an early date, and in reliable and complete form. Mr. Bradfield was almost without rival as a Gas Accountant. Therefore he (Mr. Jones) submitted that to give their Secretary what the Directors were asking the power to give him from time to time was the plain duty of the proprietors.

Mr. WOOD made some inquiries on the subject, to which the CHAIRMAN replied. On the motion being put to the vote, only one hand was held up against it—that of Mr. Wood, who, however, indicated that he was not animated by any personal motive, but because, in his individual opinion, he considered their Secretary was sufficiently well recompensed. Among the remarks of the Chairman was that it would be the greatest calamity to the Company if they lost Mr. Bradfield.

VOTES OF THANKS.

Moved by Mr. GROVES, and seconded by Mr. WOOD, a hearty vote of thanks was passed to the Chairman and Directors for their efficient oversight of the Company's affairs.

The CHAIRMAN, in acknowledging the vote for his colleagues and

himself, observed that their seats on the Board were not so comfortable as they used to be, owing to war difficulties and trials. This was the case everywhere. They had to bear the extra burdens; but they were proud of the position of the Company, which they were very glad to serve.

Sir Frederick Green said he proposed before the proprietors separated to ask them to pass a vote of thanks to the staff—from the highest members down to the lowest grade of workers. Difficult as had been the time for the Board, it had been still more difficult for the staff; and the way they had shouldered the extra burden had been wonderful. The Directors were round the works the other day; and he was delighted to see the manner in which women and girls were working. They were taking a part which they could hardly believe possible before the war. They were turning out quite intricate pieces of mechanism, both for the Company and the Government, and doing it exceedingly well. As a shipowner, he knew that it was no use having a good ship without good officers; and the Company were extremely lucky in their officers. He had not the slightest doubt one of the reasons that the Company had so successfully weathered this difficult storm had been the fact that they had been so well managed and guided by Mr. Stanley Jones and Mr. Bradfield.

Mr. H. W. Gell seconded the motion, which was very cordially passed.

Mr. Stanley Jones, on behalf of the engineering staff, thanked the proprietors for their kind endorsement of the confidence the Directors had in the officers and men. These were, as had been said, most strenuous times; and, if he might say so, he was personally glad his principal colleague had got some additional recognition at that meeting, because, if he (Mr. Jones) were without him, he would be like a man without a leg and arm. What with the number of Government returns which they had to assimilate, in addition to the ordinary work, they hardly knew how to get through it all. With regard to the women workers, they were a gratifying surprise in the way they filled the gaps. Many of them were the wives and relatives of the men who had gone to the front; and this was the most satisfactory way of filling the gaps, as the women had an additional interest in the Company. The men who had been left behind shouldered the extra work cheerfully. He was happy to bear testimony to the good feeling and good will of the workmen generally towards the Company, the Directors, and the officers. They appreciated very much what was done for them in the way of war bonus; and the officers in their turn appreciated such recognition as had been that day given to Mr. Bradfield.

Mr. Bradfield replied on behalf of the clerical staff. He said there had been a great depletion of the staff generally, and especially of the clerical staff, for the reason that they were not technical officers, and therefore not exempt from war service. They had, in consequence, had to introduce a number of lady clerks, most of whom had turned out very successfully, and to some of them he must pay the special tribute that they had been of great value to him and to the other heads of the departments. He should also like to acknowledge the work done by the Committees of the various Benefit Societies, of which he was Secretary. Mr. Maddocks, one of his chief assistants, was Secretary of the profit-sharing system, and he should have credit for the administration of it. He would also like to refer here to the great service rendered to him by his chief accountancy assistant—Mr. Cowee. His services were invaluable. In conclusion, he said that he was very much impressed by, and he thanked the proprietors for, their generous recognition of his services. He could best describe his feelings by a little anecdote. A friend of his who recently obtained the D.S.O., before his return to the front said: "I am fearful lest I shall not live up to my reputation." He himself would have that anxiety in the future.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

The Annual Ordinary General Meeting was held last Saturday, at the Offices, No. 639, High Road, Tottenham—the Right Hon. Sir Daniel F. Goddard, M.P., in the chair.

The Secretary (Mr. E. J. K. Fussell) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

Difficulties, but a Note of Hopefulness.

The Chairman, in moving the adoption of the report and accounts, said in his experience of public speaking he had found an advantage in striking the right note at the beginning; and he should like to do that on this occasion. He thought the right note for him to strike was that of hopefulness. He could assure the proprietors that the Directors were very thankful they were able to come before them with a report that was a great deal better than they hoped for last February; and as a result—a result which he was sure they would approve—his speech would not be so long or so dolorous or explanatory as he was compelled to make it on the last occasion. Still he considered there was a great deal that was satisfactory in the report. He must ask the proprietors to remember that the Company were still hampered in the works by the conditions of war, and by the requirements and regulations of the Government. The difficulties were evidenced in the trouble of getting supplies, in the high prices they had to pay for everything, and in the shortage of man power to carry on the work, which they were obliged to make comply with the Government desires—in fact, if he were to describe the work of a gas undertaking to-day, he should say it was a constant struggle to overcome difficulties. But as a set-off, he should like to remind the proprietors that they had the satisfaction of knowing the enormously important part the gas industry was playing in the success of the country's armies in the tremendous conflict that was still going on. He did not think it was too much to say that already during this war the gas industry had saved this country by altering its plant in order to produce those elements which were required for high explosives, of which the country was very short at the beginning of the war, but with which it was now amply supplied—thanks to the gas industry. He thought he should not be putting it too high if he said the industry would again be the saviours of the country by arranging to produce more of the tar oils which were so absolutely necessary for the liquid fuel required by their all-important Navy, whether for defence or for attack. He thought he need not make more preliminary remarks, but proceed at once to the statement of accounts.

The Capital Account, and the New Four Million Section.

From the capital account, it would be seen they had expended on new buildings and plant this half year £27,769, all of which—with the exception of one comparatively small item of £1027, which was paid as the price of a piece of land, which was very necessary for the Company, adjoining the electric supply station—had been expended on the new gas section. He was very pleased indeed to be able to tell the proprietors, after a close inspection of the works that morning, that the new section was now almost completed—in fact, it was completed in many respects. That morning they had seen the new engines started working well which were to produce the motive power for carrying on the new section. More than this, they now knew absolutely that the new section would be quite ready for use in the coming winter; and so the Company would then have all the advantage they hitherto lacked, of being able to use it for the making and supply of gas. He thought perhaps the proprietors would realize what this meant when he told them that this new section was planned for producing 4 million cubic feet of gas per day. Within two months, during which the settings would be gradually heated-up and prepared for work, they would be able to get the section in operation, and quite ready for the winter supply. Under new mains and services in the capital account, there was rather a curious item. There was no expenditure, but a credit of £405, which was rather unusual. It was arrived at in this way. What had been spent on new mains was a very small amount, because they could not get mains, or labour to lay them. They had therefore spent only £158. But they had done a good deal of work, which they had been enabled to do out of their own stores without buying any fresh material, and which had been paid for by those for whom the work was executed. This had amounted to £563. Therefore, if they took the £158 which they had spent on mains, and deducted it from what they had received for work done, they obtained the credit balance of £405. On new meters they had expended £3224, which seemed rather large compared with the corresponding half year. This was really a matter of provision. They had to look forward. It was daily becoming more and more difficult to get even meters; and they had taken advantage of the opportunity to buy as many as they could, so as to be ready to meet requirements. The item of new stoves and fires was considerably less than it was a year ago—in fact it was only about one-fifth of what it was then. This was due to the fact that they could not obtain the stoves. They could place any quantity of stoves and fires if they could only get them. The prevailing conditions of war, occupying the manufacturing firms with other work, had prevented the supply coming forward, and there was really not sufficient to meet the demand. The capital account was over-expended by no less a sum than £145,385. Of course, this was largely accounted for by borrowing from the bank £160,000, which they had required to carry out all this new work. As soon as ever circumstances would allow the Board to place fresh capital, they would do so, and liquidate the loan from the bank. One satisfaction they could get out of this was that it showed the bankers had complete confidence in the future prosperity of the Company, or else they would not advance them so large a sum as they had done.

Coal and Oil Gas Making.

Turning to the revenue account, the quantity of coal used was close upon 9000 tons less than in the corresponding half of 1916. This would have meant in ordinary circumstances that they had saved £10,500. But they had not done so, because the rest of the coal—70,245 tons—had cost them £11,900 more; so that the result was that the expenditure for coal was £1400 more. Then if they had saved 9000 tons of coal, they had had to use something else to supply the gas. They had had to use more oil. The works were not capable of supplying all the coal gas wanted; and therefore they had to produce carburetted water gas in order to supplement it. They had used 84,364 gallons more oil, which had cost £3400. Then, in addition to this, the 756,709 gallons ordinarily used had cost more money, amounting to £19,640; so that the proprietors would see in the revenue account that oil had cost them £23,040 more than it did this time last year. Now they were told by the Ministry of Munitions that they could not let the Company have any more oil. This, of course, made rather a serious alteration in their methods of working, although personally he could not say he was very sorry for it, because it was really too expensive to make water gas and to carburet it with oil. It cost them 9d. per 1000 c.ft. more than coal gas to make carburetted water gas. Therefore, the sooner they could get rid of manufacturing it so much the better for the undertaking. Now that they saw the new coal-gas section coming into operation, they were very happy to be able to reduce the quantity of carburetted water gas. They had used more coke, at an increased cost, for the making of water gas. He thought it would be interesting to the proprietors to know this fact, that the net cost of the coal and oil used in the half year was three times as much as it was in the pre-war half year. This explained why they had had to raise the price of gas. As to the item of repairs and maintenance of works, there was very little to say. It sometimes went up, and sometimes went down, according to the work they had to do. Of the £19,895 which they were expending for repairs and maintenance, no less a sum than £1500 was spent in renewals in the No. 1 vertical retort house. Wages were higher than might be expected. This was partly due to the increased cost of living, and partly because they had had to use the Ponders End works, which were very extravagant in regard to labour. He was thankful to know that, if they had good fortune with their new plant, they would not have to use the Ponders End works during next winter.

Other Items in Revenue Expenditure.

Coming to the expenditure on distribution, the difference between this and last year was very trifling. Then there was an item "Renewals

Fund," to which they were appropriating £4000. During the last two years, they had been working their plant at the highest possible pressure; and they must foresee that the result of this would be expensive repairs and renewals. In addition, there were the works at Ponders End, which were not profitable to work: so that they must be prepared to put them into good working order. Therefore they thought it a wise and prudent policy to appropriate £4000 from the revenue account for the purpose of renewals. As to the co-partnership, he was very sorry about this. They were only expending for this £469, against £2337. The reason for this was that the co-partnership proposition was based on a sliding-scale, just the same as the dividend proposition. As the price of gas went up, the bonus went down; and as their price had now gone up to the present figure, they could not pay any bonus. The £469 was the bonus for the first three months of the year, and for no time after that. He was sorry for this; but it could not be helped. It was the basis upon which they set out with co-partnership; and they could not alter the position. The pensions fund and superannuations had increased. The item included £387 which the Company did not pay before. The basis on which the pension fund was arranged was that the men paid one-third of the subscription out of their wages week by week, two-thirds were contributed out of their co-partnership bonus, and then the Company added a similar amount—that was to say, doubled what the workmen had paid. As there was no bonus now, there would be no money from it to pay to the pension fund; and it looked on the face of it as if the pension fund would have to be dropped. The Directors, however, had taken this very carefully into consideration; and it did not seem to them just that their men, who had worked long and well in the interests of the Company, should be made to sacrifice their pension allowances because the country happened to be at war. So what the Directors had decided to do was, until they could restore the bonus to its previous position, to pay the two-thirds out of the profits of the Company which should be paid by the workmen themselves. He felt sure the proprietors would agree that this was good policy. He had the pleasure of meeting the men at the works some time ago, and explained this to them; and they received the decision of the Board with great pleasure and gratification, and were quite satisfied with it. Then there were the special war items. They had naturally increased, because the cost of living had increased. One further little item was aircraft insurance. Some people did not think they ought to have expended money on aircraft insurance. Since they did so, they had had four bombs dropped on their premises, which might have done a great deal of harm; and so it was not a bad thing to be insured against such a risk.

THE REVENUE.

The income from the sales of gas to private consumers had increased by nearly £43,000. This was largely due to the advance in price, which was now 3s. 4d. per 1000 c.ft. This was a very high price compared with that at which they had been selling gas. But it was not a higher price than the great Gas Light and Coke Campany were now charging; so that there was nothing to repine about over that. In 1916, the price was 2s. 3d.; so that the 3s. 4d. accounted a good deal for the rise in the income from the sale of gas. He could not say more than that they simply could not help this. They were obliged to make both ends meet. Public lighting showed a reduction of £4307. They must put this down to the Huns; it was purely and simply the fault of the war. As to residuals. Having carbonized 9000 tons less coal, they had some 4500 tons less coke for sale. Fortunately, as the price of coal went up, so did the price of coke; and they had realized a higher value for it—indeed, it almost equalized the loss. They were pressing the sale of coke as much as they could among the people in the neighbourhood. The great difficulty they had now to contend against was transport. They could not get horses or carts nowadays, nor could they get men to drive them. The motors, too, were restricted in petrol; and the result was that it was very difficult to get coke transported to those who wanted it. Tar also suffered because of the less quantity of coal carbonized; but it realized a higher value, and showed a small increased profit. Sulphate of ammonia was also less, because of the smaller quantity of coal carbonized. Unfortunately, they had not a higher price. The Government restricted the price at which they could sell the sulphate for agricultural purposes; and they had not exported any. It had all been used for home agriculture; and if they got less profit, they could only console themselves by the thought that they had been very patriotic.

THE FINANCIAL RESULT.

The result of the gas revenue account was that the balance to profit and loss account—£31,239—was £648 more, after charging £4000 for renewals fund, which was not a bad state of things. The electricity station, which had only a small business yet, was constantly improving. The profit and loss net balance, after paying all charges, was £19,217; and the amount required to pay the full statutory dividend at the present price of gas was £14,251, as they were able to carry forward £4466, which compared with the £2185 carried forward a year ago, and compared more favourably still with the £286 which they carried forward last January.

IMPROVED PRESSURE AND LOWER UNACCOUNTED-FOR GAS.

He had one little piece of good news for the housewives of the district. The Directors and their Engineer had been looking for, and longing for, a new apparatus which would help them to increase the pressure of gas, from a deficiency of which consumers had suffered. He was happy to say that the apparatus had now been delivered; and the Deputy-Chairman and himself saw it at work that morning. After it had been in operation a little time to get thoroughly into its bearings, he had no doubt it would be successful in immensely improving the pressure in the district, especially during the Sunday dinner cooking hours. There had also been an improvement in the unaccounted-for gas, which was now a little over 5 p.ct.—a good figure for a Company of this size and a district of this character.

THE END OF A LONG TRAIL OF DEFICITS.

His task was done in explaining the accounts. He began with the key-word of hopefulness; and he was not going to end his remarks in a minor key. He had been giving the proprietors common-place elements of what he might call the bread of their existence. Now before he finished, he was going to put a little jam upon the bread. For seven consecutive half years, the net profit had fallen short of their requirements for dividends. From Dec., 1913, to Dec., 1916, this shortage amounted to £67,070. He was happy to say that now this long trail of deficits had ended; and this half year they were able to show a surplus of £3784. If they had had all these deficits, whence had they got the money with which they paid the dividend? They had drawn it from their reserves; and their accumulated reserves, which at June, 1914, stood at £100,414, at Dec., 1916, had been reduced to £61,520—39 p.ct. of their savings in reserve had gone. But the tide had now turned, and the reserves had recovered to £70,339. Looking at these facts and figures, he could with confidence say to the proprietors that they might look forward to the future with hopefulness.

Mr. HENRY BAILEY seconded the motion.

PROPRIETORS' VIEWS AND INQUIRIES.

Mr. H. MICHEL said he ventured to think that on this occasion, when the Directors were facing not only the proprietors, but the consumers of gas in a very large and populous district, they should call attention to one feature in the affairs, not only of this Company, but of all gas companies in general, which he did not think was entirely appreciated either by the stockholders or the consumers—that was, that this vast industry, with all its beneficial effects to the community, was carried on at a very small profit. Here the Company had a considerable capital; but the undertaking was carried on with an interest on the capital of less than 5 p.ct. Therefore, the consumer, if he felt he was paying a high price for gas, had the consolation of knowing that he was getting that gas at the lowest possible price at which it could be manufactured. He thought this fact was very important, and should be impressed upon the consumers. Of course, the small rate of remuneration was reflected in the price of gas stocks on the London Stock Exchange. Speaking from memory, he believed that there were, out of some 36 or 38 gas companies whose stocks were quoted, only some six whose stocks were to-day standing at a premium.* If they realized this fact, too, the consumers would further appreciate that they were being served at the smallest practicable cost. He asked the Chairman whether he was in the happy position of a Director of two gas companies whom he (Mr. Michel) recently met, who informed him that they had obtained a reduction of 2s. 6d. per ton in the cost of their freight for coals. If this Company had the same experience, it would make a difference to them next half year of about £8000. He urged the great importance of cultivating the use of electricity for power purposes. They had an extensive industrial area here; and it was not nearly covered yet. He remembered their late Chairman (Sir Corbet Woodall) once said he believed there was a large future for both gas and electricity in this country. In conclusion, he remarked that he was glad there was a return, at all events, to a comparative prosperity. The decrease all at once of 2 p.ct. in the dividend on the "A" stock, especially with an income-tax of 5s. in the pound, made some of them look very serious indeed; but they knew it was due to circumstances beyond human control.

Mr. WELD said he understood the Chairman to say the reserve fund had now been made up to £70,000. He failed to see that this was so.

Mr. JOHN RANDALL observed that he gathered from the Chairman's remarks that the whole of the co-partnership bonus had now gone, in consequence of the increase in the price of gas. He was glad the Directors had taken the step of doing something towards meeting the loss to the men by making an addition to the pension fund. He was a firm believer in co-partnership; and he was wondering whether anything could be done to meet the loss the co-partners had sustained through unavoidable conditions. They heard from the Chairman that the price of gas had increased 1s. 1d. in the year. Such a thing as that could not have been within the dreams of possibility to those who drew up the co-partnership scheme. For many years, they had been accustomed to a slow rise in the amount of dividend, and the co-partners had received a better and better return. This had been swept out of existence very suddenly through circumstances that could not have been foreseen. He was wondering whether the Directors could not take this matter into consideration, and give some kind of special bonus to be distributed on the same lines as the £469 that appeared in the revenue account on this occasion. It was true the Directors had been very liberal in the allowances they had made under the heads of payments to dependants, and war bonus on wages, which meant the big sum of £8500. But he should like them, between now and the next half-yearly meeting, to take into consideration the question of whether a small bonus could not be granted to the co-partners, to show the sympathy of the proprietors with the system, and their desire to see it soon in active existence again.

Mr. JAMES MOORE said that, while believing in co-partnership, they saw that the wages of the men had been raised by a war bonus, allowances were made to their dependants, and they had a chance of a pension; and he did not think in present circumstances the money of the proprietors should be given away in the manner suggested by the last speaker. Co-partnership would come back to its own again on its own basis.

Mr. A. W. REID asked whether the Directors had considered the question of the supply of gas for driving motor vehicles, in place of petrol.

The CHAIRMAN said he was afraid he could not hold out any hope to Mr. Michel that there would be a reduction in the cost of coal. The Directors had not found it yet. There was only one point in regard to that. The Government were anxious they should turn out as much tar oils as they could, and so might be willing to give some facilities in regard to the supply of coal. Regarding the supply of electricity for motive power purposes, he realized the importance of this. But he

* Probably Mr. Michel has overlooked the fact that these are unconverted stocks, and that the others are those that have been converted to a lower dividend basis.—ED., G.J.

reminded the proprietors that up to the present time the Company had only a small area in which to distribute electricity—that was Wood Green; so they had not such a large opportunity of development in that respect as they would like. As to Mr. Weld's inquiry concerning the £70,000 in the reserve "fund," he did not think he said "fund," but "in reserves." If they took the £4466 profit carried forward, the reserve fund of £31,180, the insurance fund of £20,339, and the renewal fund of £14,353, they had the £70,000 which constituted their reserves. As to the co-partnership scheme, it was drawn up with a fixed price of gas to yield a certain bonus to the workmen. They had been obliged to live-up to the agreement. It might be that they had not fixed the right basis for the co-partnership, just as it might be with regard to the sliding-scale for dividends. These things might have to be altered, when they got to know all they could say about them. Now they were at war; and it was the abnormal circumstances that had thrown them into the present position. When the price of gas returned to its normal state, the bonus would again go up, and there would be little difficulty about it. As to the sale of gas for motive power for road vehicles, they could not get the cylinders for compressed gas; and they could not get the steel with which to make them. Then there was also the plant for compressing the gas. The only means was to use flexible gasholders. This was being done considerably; but in every direction they were hampered by the difficulty of obtaining materials.

The motion was unanimously carried.

DIVIDENDS.

The DEPUTY-CHAIRMAN (Mr. Henry Woodall) moved the declaration of dividends at the rates per annum of 5 p.ct. on the preference stock, 5½ p.ct. on the "A" consolidated stock, and 4 p.ct. on the "B" consolidated stock. He remarked that this was a great improvement upon last half year; and, besides, they were increasing the carry-forward, and placing £4000 to renewal fund. It was essential to keep the renewals fund in the highest possible state in view of the present difficulties with, and costs of, materials and labour. One other point. While regretting very much the necessity of raising the price of gas to a point that wiped out the co-partnership bonus, they had the happiness of knowing that they were adding to the pensions fund, payments to dependants, and war bonus, £2854 more than in the corresponding half of 1916.

Mr. H. D. ELLIS, in seconding, congratulated the proprietors upon the improved position and prospects of the Company, of which the enlarged dividend was a solid and substantial evidence.

The motion was adopted.

RE-ELECTIONS.

Proposed by the CHAIRMAN, and seconded by Mr. WELD, Mr. John Walker Ford was re-elected to his seat at the Board, as was also Mr. H. D. Ellis, on the motion of the CHAIRMAN, seconded by Mr. JAMES BIGGS.

The retiring Auditor (Mr. John Eve) was re-appointed on the motion of Mr. J. W. LYNCH, seconded by Mr. REID.

A VOTE OF THANKS.

Moved by Mr. MICHEL, and seconded by Mr. J. B. SHERWIN, a hearty vote of thanks was passed to the Chairman, Directors, Auditors, officers and their staffs, and the workmen. The men at the front also had sympathetic reference.

The CHAIRMAN, in his acknowledgment on behalf of the Board, mentioned that last half year the Company lost thirteen more of their men, who had made the extreme sacrifice of their lives for their country; and there were still serving some 381 of the Company's men.

Mr. A. E. BROADBERRY (Chief Engineer and General Manager), in the course of his reply on behalf of his staff, men, and himself, remarked that, with the new section coming into operation, they felt that the worst of their difficulties had been passed, and that for the future they would be able to carry on much more easily than before. Their difficulties, of course, had been considerably greater owing to so many of their regular men being away in the army. But having got through what they believed was the worst of the time, he thought that, until the finish of the war, they would now be able to carry on much more comfortably.

Mr. FUSSELL also replied, on behalf of his department, mentioning among other things that he had received every assistance from those who had come to take the place of those who had gone to the front. He was fortunate in having as a brother officer Mr. Broadberry. Between them and all round there was loyal co-operation.

THE WANDSWORTH RESULTS.

It will be the pleasure of the Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company (Mr. H. E. Jones) to inform the proprietors next Tuesday that the sale of gas for last half year shows an increase of 9·7 p.ct. over the same period of 1916. The revenue account, however, presents a profit of only £22,465; and after providing for the interest on debenture bonds and stocks, and on deposits and loans, there remains to the credit of the profit and loss (net revenue) account an amount of £15,448. The dividends recommended are the statutory ones, at the following rates per annum: On the Wandsworth "A" stock, £7 5s.; on the Wandsworth "B" stock, £5 15s.; on the Wandsworth "C" stock, £5 1s. 6d.; on the Wimbledon stock, £5 2s. 6d.; on the Epsom stock, £5 15s.; and on the new ordinary stock, £5 1s. 6d. p.ct. The decreases in the rates of dividends are due to the increase in the price of gas in accordance with the sliding-scale; but they will require a contribution from the reserve fund of £10,862. The Directors regret that they have had to increase the price of gas by 6d. per 1000 c.ft. from Ladyday, 1917. This makes a total advance over the pre-war period of 9d. per 1000 c.ft. upon the very low price then charged. This increase has become necessary owing to the enormous addition to the cost of coal and freightage, to the heavy cost of allowances and war food bonus, and the advance on all materials and wages.

The accounts show that coal (99,571 tons were carbonized) cost £136,778; and oil, coke, and water, £27,231. The quantity of oil used was 528,885 gallons. The aggregate manufacturing costs were £204,742, out of a total expenditure on revenue account of £272,186. The quantity of gas made was 1,517,846,000 c.ft., and sold 1,417,013,000 c.ft. The receipts for gas amounted to £178,075. Rental of meters, stoves, &c., contributed £29,972; and residual products, £86,562. The total income was £294,651; and the balance to profit and loss account, £22,465.

EDINBURGH GAS EMPLOYEE REFUSED A CLEARANCE CERTIFICATE.

At the Edinburgh and District Munitions Tribunal on Tuesday last, a man employed by the Edinburgh and Leith Gas Commissioners as a rigger's labourer applied for a clearance certificate on the ground that he received insufficient pay, and that he wanted to go to munition work, where he would have better conditions and more money.

The Commissioners' Engineer and Manager (Mr. Alexander Masterton) stated that the man was employed in painting and patching gasholders at the Granton Gas-Works. It was difficult to find men who were able to do work at a high altitude—hence the Commissioners' opposition to the application. The man entered the service of the Commissioners in February last; and it was strange that he should come forward now and ask for a certificate, seeing that Sir Richard Lodge had recently granted, as from July 1, an additional war bonus of 5s. per week. The man's pay (including 11s. bonus) was 38s. 7½d. for a 51-hour week. The Commissioners' establishment was a certified one; and they were doing important Government work.

The applicant (a discharged soldier) said he was not so strong as he used to be, and found the high climbing too much for him.

Sir Andrew Fraser, who presided, said that the Court held that, in the circumstances, the withholding of the certificate was not unreasonable. The certificate was accordingly refused.

COAL AND COKE RATIONS.

The Coal Controller's Proposals.

Last week, Mr. GUY CALTHROP, the Controller of Mines, issued his instructions as to the use of coal and coke during the ensuing winter season; and it was prefaced by a full "Explanatory Memorandum," which points out that the Order does not extend to coal used for industrial purposes—such as the production of gas, or the generation of electricity, or the raising of steam—except where such industrial purposes are subsidiary to the use of coal for household or domestic purposes, as may be the case with large hotels, blocks of residential flats, theatres, churches and chapels, clubs, meeting rooms, baths, public buildings and institutions, &c., to all of which the Order extends. It also extends to industrial purposes, where the industry, trade, or business is carried on in a dwelling house or in a building used in connection therewith.

The routine or machinery of the scheme, so far as regards the consumer, is of the simplest character, and follows as closely as possible the ordinary routine or machinery of sale and purchase. No cards or tickets are required for the purchase of coal; but the execution of the scheme is left in the hands of the coal merchants and retailers so as to occasion as little disturbance as possible to the ordinary channels of trade. To safeguard the interests of the whole body of consumers if there should be a shortage, the control of the detail operation of the scheme, so far as regards the consumer, is vested in the local authorities, acting through a specific representative, subject to the approval and inspection of the Controller or his representatives. Requisite powers are conferred on local authorities for this purpose.

The Order requires that an ordinary consumer of coal and coke must not (1) deal with more than one coal merchant, except for the purchase of coke from a gas company; (2) consume more coal than is his rightful allowance; (3) obtain coal in quantities in excess of 2 cwt. in one week (or in the case of coke 3 cwt.), except under a requisition duly approved; (4) store more coal at any time than will last him a year if he burns no more than his allowance; and (5) waste coal. The procedure under the Order in so far as it affects consumers is made as easy as possible. In the first place, a consumer requiring no more than 2 cwt. of coal or 3 cwt. of coke in the week can purchase these quantities weekly without any formality of any kind. Next, a householder requiring no more than the weekly or monthly allowance of coal provided by the scale set out has only to fill up a simple requisition form, to be obtained of his usual coal merchant, and to leave it with him again when - led up. He may then order his coal as he requires it, without any further formality, except that his orders must be in writing. Only consumers requiring special allowances of coal, or calling for special assessment, will be troubled with inquiries in the ordinary course.

The final clauses of the Order set forth the duties of the local coal overseers, who will be appointed by the local authority under the Order, and of the coal merchants' supervisors, with whom they will co-operate, who are nominated by the merchants in the distribution areas fixed by the Controller.

Melton Mowbray Gas Company.—The annual meeting was held last Friday week, when the balance-sheet presented shewed that slightly less business had been done during the year. The sales of gas had gone down—principally owing to none of the public lamps being lighted during the year. The profit and loss account shewed a balance of £4450. A dividend of 6½ p.ct. was declared.

AUSTRALIAN GAS-WORKERS RESTLESS.

A Stop-Work Meeting Called.

The "Melbourne Argus" for June 4 reported that a stop-work meeting (which amounts to a one-day strike) was to be held in Melbourne the following Thursday morning by the members of the Federated Gas-Workers' Union. A decision to this effect was arrived at by the members of the Union at a meeting held in the Trades Hall the previous Saturday night.

An official of the Union stated that at this meeting great dissatisfaction was expressed at the action of several gas companies in Victoria which, it was asserted, had refrained from giving effect to the award delivered by Mr. Justice Higgins last April so far as its retrospective conditions were concerned. In the award the increased rates were made retrospective from November, 1915. The Victorian companies concerned were those at Brighton, Williamstown, Footscray, Box Hill, Bendigo, and Ballarat. The Metropolitan Gas Company of Melbourne was joined as one of the respondents when the case was before the Court; but the retrospective conditions did not apply to it, as it had granted increases under an agreement in 1915. The other companies had made promises that the back-money would be forthcoming. A motion was submitted at the meeting that an immediate cessation of work take place by the staffs of the companies concerned; but after discussion it was resolved that the meeting should be adjourned until the Thursday following, when further consideration would be given to the grievances of the men.

As the motion was agreed to, the employees of the Melbourne Gas Company were included; so that they could take part in the meeting. This meant, our contemporary pointed out, that the manufacture of gas in Melbourne, and probably in Bendigo and Ballarat, would be entirely suspended. Should the stoppage be confined to only one day the public and industries that rely on gas for domestic and motive power would not be seriously inconvenienced. A shortage of gas, however, would follow a suspension of work for a few days. About 800 men were concerned.

Referring to the matter, Mr. P. C. Holmes Hunt, who represented most of the respondents in the recent case before the Arbitration Court, said that the trouble had reference to an award made by Mr. Justice Higgins on April 4, under which rates of wages were made retrospective from November, 1915, against all the respondents before the Court excepting the Melbourne Gas Company. The retrospective rates were based on a log served on the various companies in September, 1915; but this dispute was never heard by the Court—a new log being served in November, 1916, on which the Court made its award in April last. The compilation and checking of these new rates, and in many instances the new gradations of pay over a period of twelve months, had necessarily taken considerable time, and in some cases the work had not yet been completed. Moreover, it had been found that the award made covered many items which were not demanded in 1915, and therefore could not have been in dispute before Dec. 20 last—the date on which the Court got cognisance of the dispute. Consequently, it was necessary for the award of the Court to be corrected before being signed by the Judge; and as soon as this was done, the companies would pay the rates. The difficulty had been pointed out to the Union, and also to the Court; and the representatives of the companies had been asked by the Industrial Registrar to attend his office in regard to the position. It was understood the Union representatives would also be present. Despite the knowledge, therefore, of the difficulty facing the companies, and the fact that the Court had been asked to deal with the matter, the Union apparently intended to take the matter into its own hands, and announced its intention to take steps calculated to seriously interfere with the supply to the public of such an important commodity as gas. The companies affected by the retrospective operations of the award, in addition to Ballarat, Bendigo, Brighton, Williamstown, Footscray, and Box Hill, are Hobart, Launceston, and Adelaide.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 20.

The tar products market for the past week has been steady. With regard to pitch, the price is firm at about 45s. per ton net in bulk at maker's works for export. There are considerable inquiries from the Continent; and it may be mentioned that some shipments are being continued throughout the summer months. Ordinary London creosote, although under Government control like other creosotes, remains firm at about 4¼d. to 4½d. per gallon net for sale under licence. Solvent naphtha is unaltered at about 2s. 2d. to 2s. 3d. net per gallon in bulk *ex* maker's works.

Sulphate of ammonia is in steady request for forward delivery for home agricultural purposes, on the basis of the official prices.

Tar Products in the Provinces.

Aug. 20.

There is little fresh to report concerning the markets for tar products with the exception of pitch, which is again firmer. Better prices have been paid, especially in London. Solvent naphtha is also firmer.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Continued improvement is to be noted in the market for pitch; and the remunerative prices now obtainable in London for shipment have been reflected to a slight extent in the Provinces, where an upward tendency is to be noticed. Some idea of the improved conditions may be gauged from the Clyde quotation of 19s. to 20s., whereas it was not so long ago that a seller—if he wished to sell—had to accept 15s. 6d. to 16s. 6d. Quotations for next season's shipment remain at about 45s. London. The outlook remains good, and a little more concerted action on the part of producers would probably bring about better prices for a portion of the business for East Coast shipment. Naphthalenes show no change. The system of licences is the great drawback to business, and no relief in this respect can be expected until the war is over, or, at any rate, nearer its finish than it is at present. Licences being required for creosote also, trade, apart from Government requirements, is at a standstill. A few licences have been issued, but these expire in about six weeks' time. Practically the whole of the output is being used for national purposes. Naphthas remain firm; 2s. being asked for solvent kinds, while heavy is unchanged at 1s. 5d. Aniline oil (pure) exhibits an easier tendency, and cresylic acid is off colour. This is somewhat extraordinary, because, at this season of the year, and in the absence of the other chief ingredients of disinfectants, there should be a good market for it.

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 25s., Midlands 23s., North 23s. 6d. per ton, *ex* works.

Pitch: East Coast, 17s. to 18s. f.o.b.; West Coast—Liverpool and Manchester 17s. 6d. to 18s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190 % 1s. 4d. to 1s. 5d.; North 1s. 2d. to 1s. 3d. per gallon; 90-160 % naked London 2s. 2d. to 2s. 3d.; North 1s. 8d. to 1s. 9d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8½d.; North 6½d. to 6¼d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95 %, 2s. 5d. and 2s. 6d.; 97-99 %, 2s. 8d.—2s. 9d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton.

Sulphate of Ammonia.

Home trade orders are still plentiful, not only at the low price up to September, but at the higher quotations for the rest of the year and for the spring. It is by this time quite clear that the Government intend to press an increased use of fertilizers generally on the home agriculturalist; and a recent statement by Mr. Prothero suggested that the Government may be able to increase five times the amount of sulphate for the harvest of next year. The farmer is already using more than ever before, and is being very well treated under the new Corn Production Bill. The sulphate manufacturer, however, has a feeling that the trade is not being fairly treated, and that a definite fixing of values should have been included in the scope of the Bill. As it is, Government control is practically certain during the currency of the Act, and any attempt to raise the price of sulphate will cause the farmers to quote the conditions prevailing prior to the fixing of prices for grain, &c., among which is the present official limit for sulphate.

This feeling, and the confusing regulations regarding payment and delivery, are retarding business, in spite of the fact that manufacturers will be compelled, more and more as time goes by, to look to the home trade for the largest part of their business. A few licences have been issued for limited quantities at about £22 10s. per ton f.a.s.; but it is evident that export trade will be kept within narrow limits during the war. Several of our late chief foreign customers are already becoming producers of sulphate, and after the war, so far from buying from this country, may, and probably will, become our competitors in their adjacent markets. American competition will also have to be met. The United States output for 1916 is returned at 294,800 tons, and the consumption at roughly 315,000 tons. A further increase in home production is practically certain during the current year, which will doubtless more than make good the deficiency in supply; and as less than 40 p.ct. of metallurgical coke was produced in bye-product ovens last year, America looks like having an exportable balance in the near future for which there will be a ready market in the Far East. France, however, will be a large buyer of sulphate after the war, and our manufacturers might do worse than make some efforts to cultivate her trade by the inauguration of a well-considered propaganda and educational scheme.

The Salford Town Council have confirmed a resolution of the Gas Committee to make a grant of £100 per annum to the Red Cross Hospitals in the borough, in lieu of supplying gas free of charge, as on previous occasions.

Chemical Engineering and Wilton's Patent Furnace Company, Ltd., was registered as a limited liability company on the 13th inst., with a capital of £20,000 in £1 shares, to take over the old-established business of the Chemical Engineering Company at Hendon. The Chemical Engineering Corporation, Ltd., was registered the following day, with a capital of £5000 in 20,000 "Management" shares of 1s. each and £4000 ordinary shares of £1 each.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade still shows a good deal of irregularity, mainly due to the scarcity of ready steamers; the demand being on the whole a little better. In steam coals, some inquiry is shown for Norwegian buyers, and the market is rather firmer. Best Northumbrian steam are 30s. per ton f.o.b.; for second-class descriptions, the current quotation is from 25s. 6d.; and steam smalls are in full supply at from 18s. 6d. to 20s. In the gas coal trade, the consumption increases, more especially for home needs, and also to add to the stocks in hand. Best Durham gas coals are quoted at 25s. per ton f.o.b.; second-class qualities are about 23s. 6d.; and "Wear Specials" are steady at from 26s. 6d. to 29s. 6d. The rate of freight on gas coals is from 15s. to 16s., Tyne to London, according to size of steamer. Some shipowners complain of the very heavy insurance charges, which help to stiffen these freights and make the gas coal dearer when sea borne. There is little new as to the gas-coal contracts. Coke is steady; the home use being heavier, though exports are limited. Good gas coke is from 30s. to 32s. per ton f.o.b.

Croydon Gas Company.

At next Friday's meeting of the proprietors (the 141st ordinary half-yearly general meeting) the Directors will report that the sale of gas last half year exceeded that of the corresponding period of 1916 by 9·13 p.ct. The number of consumers increased in the half year by 158, and that of stoves on hire by 186, while 565 stoves were sold to consumers—representing a total increase for the half year of 751. The tar dehydration plant mentioned in the last report has now been brought into operation. It is mentioned that there has been established in connection with the co-partnership scheme a "Contributory Pension Fund," guaranteed by the Company. Having regard to the effect on the co-partnership bonus of the abnormal conditions which prevail, they have also amplified the co-partnership scheme to the extent of providing that there shall be a minimum bonus of 4 p.ct. Part of the contributions of co-partners to the pension fund is charged against this bonus—the remainder being paid by co-partners by way of deduction from wages. After providing for all fixed charges, there remains available for division a balance of £35,547, and the Directors recommend that dividends be declared at rates of 14½, 11½, 5, and 10 p.ct. per annum on the various classes of stock. These will absorb the sum of £24,103, leaving a balance of £11,444 to be carried forward.

Burnley Corporation Accounts.

The Burnley Corporation's annual statement of accounts gives the result of the working of the Gas Department during the year ended March 31. On the expenditure side appear the following amounts: Coal, £42,235; cannel, £2012; coal-storing and unloading, £760; gas oil, £6912; coke used for water-gas, £3078; wages of stokers, £6691; repairs and maintenance of works and plant, £7476. Other expenses brought the manufacture of gas to £70,114. The distribution of gas cost £5194; public lamps, £1110; rents, rates, and taxes, £5318; management expenses, £5012. The total working expenses were £86,794. The income from the sale of gas, less discounts and allowances, was £88,132. With public lighting and other contracts the total income for gas sales was £90,336. Rentals brought in £1169, residual products, £26,955. Altogether the income from all sources was £118,545. Against an estimate of £3440, the department contributed to the rates £2194. The income fell £1246 below the estimate. The reserve and depreciation fund stands at £11,049. The capital outlay during the year was only £151 18s. 4d. The allowance to employees who have joined the forces was £1314. The repayment of loans during the year was £11,264. The tax on profits amounted to £6178. The cost of erecting the tar distillation plant was £3612.

Appeal for a Stoker.—The Rugeley Gas Company have appealed to the Mid-Staffordshire Appeal Tribunal for a gas stoker, aged 34, Class A, on the ground that they were being urged to increase the output of gas, and that the man was the only able-bodied employee they had left. The Military Representative urged that exemption should be granted by the Ministry of Munitions and not by the Tribunal, and the man was given one month to enable the Company to obtain the necessary certificate.

Increased Wages at Southport.—The Southport Town Council last Tuesday confirmed the decision of the Gas Committee to increase the wages of workmen as follows: Foremen, 46s. per week; engine, machine, telpher, and vertical-retort men, 5s. 10d. per shift; stokers and carburetted water gas men, 5s. 8d. per shift—exclusive of war bonus, which is equal to 8s. per week. The men applied for an all-round increase of 15s.; while the present increase (with the war bonus) is equal to 10s. 6d. per week.

High-Pressure Gas Scheme for Stafford.—Owing to the reduced pressure of gas caused by the increased consumption during the past ten years, the Stafford Town Council have, on the recommendation of the Gas Engineer, decided to lay down high-pressure mains, and to make application to the Local Government Board for sanction to the borrowing of £3000 to cover the cost of the necessary machinery. The Gas Committee have been instructed to inform the Local Government Board, in making the application, that they were anxious not to incur any avoidable expense during the present trying times, but they were convinced that the proposal of the Engineer should be entertained, not only in the interests of the general body of consumers, but for the purposes of keeping up an adequate supply to the various works, and, in addition, to enable a full utilization of the output of the vertical retorts, which it is hoped will be in operation in time for the coming winter. Among the tenders that have been accepted in connection with the scheme are those of the Bryan-Donkin Company, for compressors and governors, £738; and the Gas Distribution Company, for supplying, laying, welding, and testing mains, £1387.

Peterborough Gas Company.

Alderman D. H. Redhead presided last Tuesday at the half-yearly meeting of this Company, when the Directors reported that, after paying dividends and other charges, there remained a balance at June 30 of £10,896, from which they recommended dividends of 5 p.ct. on the preference "A" shares and 8 p.ct. on the consolidated ordinary stock. This would absorb £2972, and leave a balance of £7923. The Chairman, in moving the adoption of the report, which was agreed to, explained that the decrease in the consumption of gas has been 3,339,000 c.ft., caused by inability to give full pressure during the winter. They had been unable to maintain the pressure because the staff had been depleted to the extent of one-half. Munition works depended upon them for gas, and had to be first considered. The Government were pressing them to make more gas and more tar; but they could make neither tar nor gas unless they had the men. For twelve months they had been asking for machinery which would help them; but they were not permitted to have it—the Government declaring there was other work which was more essential. They had therefore had to get on the best way they could; and one thing which the Directors rather boasted of was that, despite all the difficulties, they had neither raised the price of gas nor lowered the dividend. This could be attributed to their foresight in accumulating reserve to meet such times as they had been passing through. They had been paying about 4s. a ton more for coal than last year.

Bournemouth Gas and Water Company.

Mr G. Crispe Whiteley is expected to occupy the chair at next Friday's meeting of this Company. The Directors report that, for the half year to June 30, the revenue receipts again showed a substantial increase over the corresponding period of 1916; but the increase was more than absorbed by the increased cost of coal, wages, and other materials. The Directors mention that in May the s.s. "Corbet Woodall," which was built for the Company's service, was lost; and as a consequence, a further increase in the cost of coal is anticipated. The increased revenue charges have rendered necessary a further addition to the price of gas as from Midsummer, of 6d. per 1000 c.ft., with the result that for the ensuing year the statutory dividend on the Company's original shares will, under the provisions of the sliding-scale, be again reduced. A further effect of this increase in price is that as from June 30 the bonus under the Company's co-partnership scheme as now in force ceased. The Directors feel that this arises from abnormal circumstances; and that, in justice to the co-partners whose loyal services to the Company they much appreciate, an alteration should now be made. They therefore recommend that a minimum bonus of 4 p.ct. should be granted. The Directors also recommend the establishment as from Sept. 1 of a co-partners' pension fund, to which both the co-partners and the Company will contribute; and at the meeting the sanction of the proprietors will be asked to the necessary alteration in the rules governing the co-partnership profit-sharing scheme, and to the establishment of a co-partners' pension fund. After writing off £2939 for works superseded, the Directors recommend the payment of the statutory dividends amounting to £20,358 and leaving £21,135 to be carried forward.

Tunbridge Wells Gas Company.

The 107th half-yearly meeting of the Company was held last Wednesday. Alderman W. H. Delves, J.P., the Chairman of Directors, who presided, said they would not anticipate a rosy account of the prospects of the Company, in view of the continuance of the war. The cost of coal during the past half year had shown the high average increase of 4s. 9d. per ton—the total cost being £7000 above that of the previous half year. The 2d. per 1000 c.ft. increase in price only came into effect from Ladyday; and the full benefit of it would be felt during the next six months, which would consequently be more favourable. The price of carbonizing materials had greatly increased; while the price of residuals remained practically the same. The price now charged for gas compared favourably with that of other companies, said the Chairman, who proceeded to remind shareholders that it was as much to their interests as the consumers' to keep down the price, as an increase of 1d. per 1000 c.ft. meant a loss of dividend of 5s. per cent. The Chairman complained of the indecision of the Government with regard to gas matters, and pointed out that for sulphate of ammonia they were realizing 17s. 6d. per ton less, although the cost was higher, while there was no corresponding proposition brought forward to make up for that. For sulphuric acid, for instance, they were paying double the pre-war price. The sale of gas during last half year had increased by 12 p.ct. as compared with the same period last year; and if the advice of the Government to burn more gas were taken, there would be a further increase. At the next annual meeting a proposal to discontinue the half-yearly meetings, but continue to pay interim dividends, would be considered, as the half-yearly meeting was really unnecessary in view of the fact that the accounts were made up annually. In conclusion, the Chairman alluded to the fact that Mr. L. J. Langford had succeeded Mr. Alex. Dougall as Engineer. The Chairman subsequently moved the declaration of the interim dividend for the half year to June 30 at the following rates per annum: 11¾ p.ct. on £20,000 of consolidated "A" stock, 9¾ p.ct. on £30,000 of consolidated "B" stock, and 8¾ p.ct. on £73,000 of consolidated "C" and "D" stock. This was unanimously carried, and the meeting concluded with a vote of thanks to the Chairman.

Workmen's Compensation Premiums Raised.—Last Friday the tariff accident insurance offices decided to charge an increase of 10 p.ct. in the rates of premium, as from Sept. 1, to meet the increase of 25 p.ct. in the workmen's compensation benefits provided for by the Bill which last week passed its second and third readings in the House of Commons.

The Sheffield Gas Company's New Works.—The Sheffield Corporation Parliamentary Committee report a communication from Alderman Irons, one of the Nominee Gas Directors, stating that the Gas Company do not intend to promote any Parliamentary Bill during the coming year, but would apply to the Board of Trade for permission to put up new works as soon as they had secured the site.

Export Prohibitions.—By an Order in Council of the 14th inst., some modifications have been made in the schedule of prohibited exports attached to the Proclamation of May 10; a number of items being withdrawn and more comprehensive headings substituted. Among others, instead of "valves, gas, steam, and water," there is inserted "valves, metal of all descriptions," followed by "valves, gas, steam, and water not otherwise prohibited."

Coatbridge Gas Company.—In the course of the proceedings at the annual meeting of this Company [see *ante*, p. 244], the Chairman told the shareholders that since their last meeting they had got their Provisional Order confirmed, giving them power to raise additional capital for the erection of vertical and up-to-date retorts; but the Treasury, in their wisdom, had refused permission to raise or spend the additional capital required. This seemed strange, as he understood they had given permission for the spending of a large sum of money on buildings in the vicinity of the works which appeared to him to be of much less national importance, and would be of no assistance in carrying on the war.

Increase Over Contract Price for Gas-Meters at Salford.—At their last meeting, the Salford Town Council confirmed a minute of the Gas Committee, from which it appeared that an application had been made by their contractors for gas-meters for an increase over and above the contract price. It was resolved, having regard to the circumstances with reference to the contract entered into by Messrs. Thomas Glover and Co., Ltd., of Manchester, that the Council should make an exception in respect of the contract and agree to pay an increase of 10 p.ct. on contract prices for all meters ordered by the Corporation from the firm after June 1—the Council reserving to itself the right to reconsider the matter on the termination of the war should such an event take place prior to the expiration of the contract.

Research Work in Domestic Heating at Manchester.—In the supplementary estimates of the Manchester School of Technology, for the year ending March 31, 1918, the Manchester Sanitary Committee (Air Pollution Advisory Board) report that the Committee of the Privy Council for Scientific and Industrial Research have given £150 towards the cost of carrying out chemical analysis and research work in domestic heating appliances (gas, electricity, coal, &c.), subject to certain administrative conditions as to accounting and publishing of results. In view of this grant, the Sanitary Committee propose to increase the salary of the assistant now engaged on the work, and to appoint an additional assistant. The investigations have now been going on for about eighteen months.

Prices at Market Harborough.—The Market Harborough District Council have decided, on the recommendation of the Gas Committee, to increase the price of coke by 2s. 6d. per ton, and also to cancel the charge for stove hire to users of gas through prepayment meters.

Gas Mains Damaged in the Southend Air Raid.—Mr. C. S. Shapley, the Engineer and Manager of the Southend Gas Company, reports that during the air raid by "Gothas" on Southend last Sunday week more than 3 ft. of their 10-in. steel high-pressure main was severed by an aërial torpedo, a 3-in. main was broken, and several services were damaged.

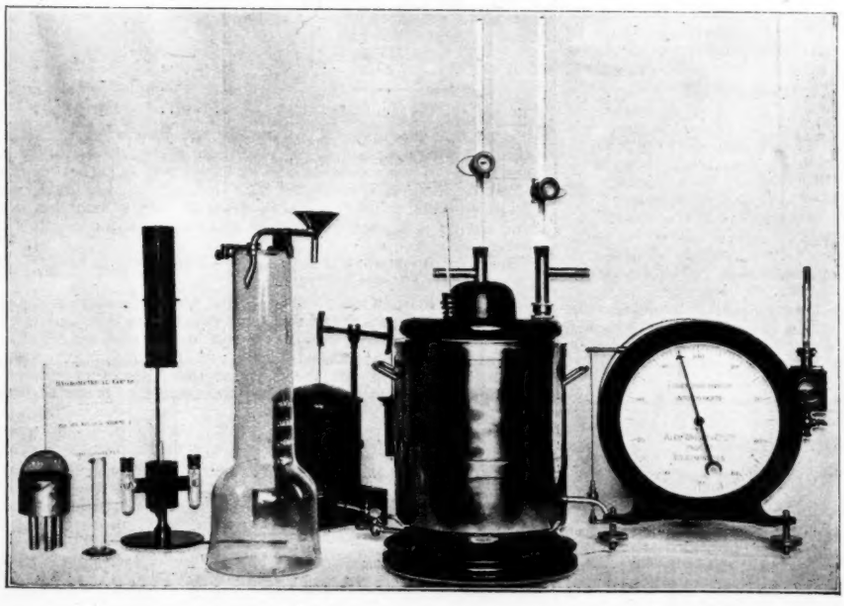
The Household Coal Distribution Order.—The Press Bureau has issued the Household Coal Distribution Order, 1917. It sets forth that the Order does not extend to coal used for industrial purposes—such as the production of gas or the generation of electricity or the raising of steam, except where such industrial purposes are subsidiary to the use of coal for household or domestic purposes, as may be the case with large hotels, blocks of residential flats, theatres, churches and chapels, clubs, meeting rooms, baths, public buildings, and institutions, &c., to all of which the Order extends. The Order also extends to industrial purposes where the industry, trade, or business is carried on in a dwelling-house or in a building used in connection therewith.

Lighting Restrictions at Malvern.—At the last meeting of the Malvern District Council before the recess till October, Sir H. Urwick brought forward the question of mitigation of the lighting restrictions in Malvern before the dark nights set in, and suggested that the Council should ask the authorities to give permission for a limited lighting or an extended time for keeping the lights going. The Chairman said the question rested with the police authorities and the Standing Joint Committee of the County Council. He promised to represent the views of the Council, and ask for the lamps to be wholly or partially lighted. Mr. Trow Smith (Gas Engineer) said he could light 150 lamps provided with clockwork controllers. He did not know where to get male lamplighters; all his staff had gone.

A Birching for a Slot-Meter Thief.—At the Burslem Police Court, last Tuesday, a thirteen-year-old boy was summoned for breaking and entering a workshop and stealing from a gas-meter there the sum of 13s., belonging to the Wolstanton Urban District Council. It was stated that the owner of the workshop noticed that the connection between the money box and the padlock of the meter had been broken. A sum of 8s. remained in the money box. A gas-meter inspector said that, according to the reading of the meter, there was 13s. missing. A police-constable spoke to interviewing the boy, who, after first saying he knew nothing about the theft, admitted that he had had 13s. out of the meter. It was also stated in evidence that the boy had been employed at the shop prior to last December, and knew how to open the door through which he put his hand to reach the meter. The decision of the Court was that the boy should receive six strokes of the birch rod.

BOYS CALORIMETER.

Gas Referees Latest Pattern



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with
HYGROMETER,
and
Printed Tables
and Formulæ
for converting
RESULTS of TESTS
into
TOTAL HEAT
B.Th.U.

ALEXANDER WRIGHT & COMPANY, LIMITED,
WESTMINSTER.

Gas-Driven Motor-Car at Oldham.—Last week the Oldham Gas Department's small Ford motor-car was seen on the streets driven by gas contained in a bag supported on a frame. If the experiment is successful, the cost of the driving power will be equivalent to petrol at 6d. or 8d. a gallon.

Arbroath Gas-Workers.—At last week's meeting of the Arbroath Gas Committee consideration was given to a claim by the labourers at the gas-works for an advance of 8s. per week in wages. It was agreed to raise the wages to the standard rate, which is equal to an advance of 4s. 3d. per week, and also to increase in proportion the wages of certain other employees at the works.

A Peremptory Demand.—The Oldbury and District Trades and Labour Council have sent the following resolution to the Oldbury District Council: "That this Council demands an immediate substantial reduction in the price per 1000 c.ft. of household gas, being satisfied that, in view of the very profitable year's trading at the gas-works, and that the District Council have been able to increase the salary of the Manager at the gas-works, the time is now ripe for a decrease."

Southend Gas Company.—For the half year to June 30 the net profit of this Company rose from £8478 to £11,325; and while the dividend on the original and new ordinary stocks is to be increased from 5 to 5½ p.ct. per annum, the rate on the "B" stock is to be 5⅛ as against 4⅞ p.ct. The balance forward will then be £1384, in contrast with £551 and £120 transferred from the reserve a year ago. The sales of gas were just over 200 millions, and compared with last year increased 10 p.ct. A considerable number of cooking and heating stoves are being disposed of.

Gas Discounts Reduced at Marple.—At this month's meeting of the Marple Urban District Council, the Gas Manager (Mr. J. K. Law) submitted a report on the increased cost of gas production; and it was resolved, on account of the increased cost of all materials and labour, that the Council reduce the rate of discount by 2d. per 1000 c.ft.—such reduction of discount to take effect at the end of the September quarter. Mr. Allan moved the adoption of the report, and said the increased cost of materials and of wages made it necessary to do something to meet the charges. Few gas undertakings had gone on as long as Marple without increasing their charges. The Council were not now going to increase the charges of gas but to decrease the discount. This course was agreed to.

Shrewsbury Gas Company.—The ninety-seventh annual meeting of this Company is called for the 1st prox., when the Directors will report that the profit on the year's working to June 30 was £5267. An interim dividend of 2½ p.ct. was paid in March; and the Directors will recommend that a final dividend of similar amount (5 p.ct. for the year) be declared. There was a further small decrease in the consumption of gas during the year, due to the extension of "Daylight Saving" and a further restriction of public lighting. The number of stoves on hire at June 30 was 5308; and there were 4631 slot meters in use. The Directors announce the resignation of Mr. T. F. Poole, who had been a Director for upwards of twenty-five years, and Chairman since 1909. They have selected Mr. Alfred Mansell to fill the vacancy.

Military Tribunal Appeal.—At the Worcestershire Appeals Tribunal last Tuesday the military appealed against the exemption granted to Mr. Laurence Adlington, the Assistant Manager of the Worcester Gas Company, aged 28, and passed Class A. Mr. E. L. Adlington, the Engineer and General Manager of the Company, gave particulars of the output of the works, where he said men were engaged on three eight-hour shifts every day in the week. The Company had within the last few months undertaken to supply gas to a large factory in the district, and they were also making bye-products for the Ministry of Munitions. His son was the Assistant Engineer, and was a highly-qualified and trained man, who had passed with first-class honours in the examinations in "Gas Manufacture." The Minister of Munitions had recently requested them to put all their stand-by plant into operation at once. Exemption was given until Sept. 30—this being final.

Price of Gas at Hastings.—Notice was given by the Hastings and St. Leonards Gas Company on June 23 that, in accordance with the sliding-scale clauses of the Company's Act of Parliament, the price of gas would be advanced 2d. per 1000 ft. to the standard price as from the current (Midsummer) readings of the meters. In publishing this intimation to the consumers, the Engineer and General Manager (Mr. C. F. Botley) said: "It will be readily understood that this alteration, arising from circumstances entirely beyond control, is taken with great reluctance; and it will be modified at the earliest possible opportunity. There is grave shortage of labour on the works, with consequent trouble and inefficiency. Much of the raw material available is of inferior quality; and obligations imposed in the national interests have to be fulfilled. Mainly due to freightage, the cost of coal has increased 100 p.ct. as compared with pre-war times. To meet this, the price of gas, including the present advance, has been increased 34½ p.ct.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 15.]

Nos. 11,303—11,587.

BLOXAM, A. G. (Zellstofffabrik Waldhof).—"Disposing of waste gases from chemical operations." No. 11,539.

COOK, T.—"Recovery of benzol, toluol, and light oils from coal gas." No. 11,434

HILL, W.—See Cook. No. 11,434.

JONES, F. J. C.—"Manufacture of gas and coke." No. 11,305.

SELAS-TURNER COMPANY.—"Gas and air regulators." No. 11,425.

STYLES, T. W.—"Adjustable brackets for lamps." No. 11,443.

TINKER, F.—"Distillation of coal and shale." No. 11,338.

TURNER, E.—See Selas-Turner Company. No. 11,425.

ZELLSTOFFFABRIK WALDHOF.—See Bloxam. No. 11,539.

SOUTH METROPOLITAN GAS COMPANY.

New Issue of Capital with the Sanction of the Treasury.

Particulars of Sale by Tender of

£250,000

FIVE PER CENT. REDEEMABLE PREFERENCE STOCK.

(Pursuant to the Powers of the South Metropolitan Gas Act, 1916.)

Minimum Price of Issue, £94 per £100.

The Stock will be Redeemed by the Company at par on the 31st December, 1924.

The Directors are prepared to receive Tenders for £250,000 of Redeemable Preference Stock at a minimum price of 94 p.ct.

The Stock will be redeemed by the Company at par on the 31st December, 1924, and will rank next after the Debenture Stock of the Company from time to time existing or authorized.

A deposit of £5 p.ct. of the nominal amount of Stock tendered for must accompany each Tender, and the balance of the purchase money must be paid to The London Joint Stock Bank, Limited, 28, Borough High Street, S.E. 1, or to the London and South-Western Bank, Limited, 170, Fenchurch Street, E.C. 3, on or before the 4th day of September, 1917.

Any amount being not less than £100 may be tendered for, and the Stock will be registered in the books of the Company in the names of the purchasers, or their nominees, free of expense.

Where no allotment is made the deposit will be returned, and in case of partial allotment the balance of the deposit will be applied towards payment of the amount due on allotment.

Dividends on the Stock will be payable half-yearly on the 15th January and the 15th July in each year. The first dividend at the rate of £5 p.ct. per annum, calculated from the dates of payment to 31st December, 1917, will be paid on the 15th January, 1918.

The present Capital of the Company is £6,609,895 Ordinary Stock and £1,895,445 Debenture Stock. Power has been taken to raise a further sum of £500,000 by Mortgage or Debenture charge.

The net profit available for dividend on the Ordinary Stock, after setting aside £56,864 per annum for interest on the existing Debenture Stock and providing for interest on temporary loans, was for the past three years as follows:—

1914	£279,458
1915	£309,642
1916	£309,340

In the half year ended 30th June last, the sales of gas, notwithstanding the lighting restrictions, exceeded those of the corresponding period of 1916 by 806,000,000 cubic feet, an increase of 12 p.ct.

To meet the greatly increased costs due to circumstances arising out of the War, the price of gas was raised as from Midsummer last to a figure which it is estimated will be sufficient to cover such additional charges.

The following statement is made by direction of the Lords Commissioners of His Majesty's Treasury:—

> The Treasury has been consulted under the notification of the 18th January, 1915, and raises no objection to this issue. It must be distinctly understood that in considering whether they have or have not any objections to new issues, the Treasury does not take any responsibility for the financial soundness of any schemes, or for the correctness of any of the statements made or opinions expressed with regard to them.

The consent of the Committee of the Stock Exchange has been obtained to dealings in the Stock after the issue of Allotment Letters. Application for an official Stock Exchange quotation will be made in due course.

A commission of one-quarter per cent. will be allowed to Bankers or Brokers on allotments made in respect of applications bearing their stamp.

Copies of this Prospectus and Forms for Tenders may be obtained from the LONDON JOINT STOCK BANK, LTD., PRINCES STREET, E.C. 2; the LONDON and SOUTH-WESTERN BANK, Ltd., 170, FENCHURCH STREET, E.C. 3, or any of their respective Branches; at the Offices of the COMPANY, 709, Old Kent Road, LONDON, S.E. 15; or from Messrs. ROWE and PITMAN, Pinners Hall, Austin Friars, LONDON, E.C. 2.

Tenders must be sent to me on or before Friday, the 24th of August, 1917, after which date no Tender can be received.

By order of the Board,
F. McLEOD, Secretary.

709, Old Kent Road, S.E. 15,
Aug. 15, 1917.

Halifax Workers' Wages.—The Committee of Production have made an award for 9s. per week advance on pre-war rates of pay for the semi-skilled employees of the Halifax Corporation. The men's demand was for 12s.; the Corporation offered 8s. About 500 employees are affected.

Price of Gas in Glasgow.—The Gas Committee of the Glasgow Town Council have fixed the rates for gas until further notice as follows: An increase of 2d. per 1000 c.ft. for lighting and domestic purposes, or 2s. 8d.; and an increase of 4d. for gas for power and manufacturing purposes—bringing the rate up to 2s. 5d.

STOCK MARKET REPORT.

THE Stock Exchange last week was able to contemplate an improvement in the general state of things as compared with the week before. To begin with, there was more animation in many markets and almost an approach to activity—if such a thing be possible in mid-August—and this was coupled with a decidedly cheerful tone. Two factors co-operated to bring about this gratifying feature—first, the marked progress at many points in the Western front, culminating in the capture of Langemark, and, second, Mr. Lloyd George's frank and lucid statement in the House of Commons upon the general position of affairs. In result, pretty well every department which was not chilled by special depression was able to show an advance.

The gilt-edged market was almost wholly good. Home Government issues were in demand. All War Loans were firm, and the 4½ p.ct. even made a further advance, although the date of the next loan is still in hiding. Consols, 6 p.ct. Exchequer Bonds, and some Colonials were strong. Home Rails were at first perturbed by strike fears, but made some recovery before the close. Argentines were similarly affected, and Canadians were inclined to droop.

In the Foreign Market, the pleasing feature was a recovery in Russians inspired by more confidence in the pacification of that afflicted land. French were also in good request, and Scandinavian and Japanese moderately so. Mexicans, too, were in better favour. The South African Market was firmer.

Business in the Gas Market was a very fair aggregate on the whole, though some days were very quiet, and the general characteristic was marked steadiness. Prices of bargains transacted were almost identically similar to those of the week before, and changes in quotation were all arising from *ex div.* adjustment, with the sole exception of Primitiva preference, which had a slight fall. Several important company meetings were held in the course of the week; and one gratifying feature of them was the ready recognition by the shareholders of the cares and anxieties which have beset directors and officers in their conduct of the business.

Bargains done for cash during the week were as follows: On Monday, Bath ordinary 82, 82½, ditto debenture 67, 67½, Brighton and Hove ordinary, 102, Gas Light ordinary, 68, Metropolitan of Melbourne 94, Primitiva 39s., 39s. 6d., Southampton debenture 66¾, 67. On Tuesday, Alliance and Dublin 53½. 53⅝, Gas Light ordinary 68½, 68¾, 69, Monte Video debenture 75, Primitiva preference 57s. 6d., South Metropolitan 72½, 74½, 74⅜, 75, ditto debenture 55⅜. 56, South Suburban 76½, 77, 77½. On Wednesday, Gas Light ordinary 68, 68½, 68¼, Imperial Continental 79½, Primitiva 36s., South Suburban 75. On Thursday, Gas Light ordinary 68, 68⅜, 68¾, Imperial Continental 79⅛, 80½, Primitiva, 36s., 36s. 6d., ditto preference 55s., South Metropolitan debenture 56, South Suburban 75½. On Friday, Continental Union, 39½, ditto preference 61, European 11½, Gas Light ordinary 68, 68½, 68¾, ditto preference 70½, Imperial Continental 79½, 80, North Middlesex 10½, Primitiva 36s., 36s. 6d., 36s. 9d., 37s., ditto preference 55s. 7½d., 57s., South Metropolitan 72¼, 74, ditto debenture 55½, 56, 56½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62*	..
1,651,868	,,	April 8	2½	5⅝%	Alliance & Dublin Ord.	59—64	56—55	53½—53⅞
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	57—62	41—53	..
50,000	10	Feb. 26	16	15/-		29—30	21—23	..
893,110	10	,,	7	7/-	Bournemouth Gas and Water { 10 p.c.	15—15½	10⅝—11½	..
115,000	10	,,	6	6/-	B 7 p.c. Pref. 6 p.c.	13½—14	9½—9⅞	..
159,740	—	—	—	4%	4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅛%	Brantford A Consolid.	261—266	79—82	..
734,920	,,	,,	11	4⅜%	Do. B New	204—209	77—80	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,300	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	102
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
345,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	59—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2½—3	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	73—74	..
560,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	61
278,400	,,	—	—	11½%	Croydon B and C 7 p.c.	..	170—180	..
	—	—	—	10%	Do. E	..	..	..
499,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	11—12	11½
16,313,430	Stk.	Feb. 10	4/17/4	37/4	4 p.c. Ord.	98—102	67—69	68—69
2,600,000	,,	,,	3½	3½%	Gas Light and Coke { 3½ p.c. max.	76—79	54—56	..
4,062,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	70—72	70½
4,674,850	,,	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	55—57	..
130,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	4⅓%	Hastings & St. L. 3½ p.c.	87—89	59—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7½—8½	..
26,600	—	—	—	9½%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7½	7⅛%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6¾	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	79½—80½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	..	..
					{ B	146—148	82—83	..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72*	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅜—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	94
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	86—88	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c.	14—15	10—11	10½
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	126—131	92—97	..
100,000	50	,,	12	11%	Do. C	118—121	85—90	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1⅝—2	36/- — 37/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2⅝—3⅞	55/- — 57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7⅞—8½	..
125,000	50	July 1	5	5%	5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	72½—75
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	55½—56½
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76*	75—77½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77*	..
135,000	,,	—	—	4⅝%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham District { A 5 p.c.	135—138	95—100	..
782,275	,,	,,	6	3½%	B 3½ p.c.	115—117	68—78	..
181,255	,,	June 26	4	4%	4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8½	90/-	Wandsworth A 5 p.c.	151—156	114—119	..
255,636	,,	,,	6½	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	,,	,,	6½	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6½	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

DEPUTY ENGINEER AND MANAGER. Ormskirk Gas and Electricity Company. Application by Aug. 31.
GAS MANAGER. Whitehaven Gas Company. Applications by Aug. 25.
WORKING MANAGER (Charlbury, Oxon). Applications to W. A. Scott & Co., 50, Cannon Street, E.C.
CHEMIST. No. 6336.
CHEMIST-ENGINEER. No. 6338.
DRAUGHTSMAN. R. & J. Dempster, Manchester.
DRAUGHTSMAN. No. 6337.
GAS STOKER. Bexhill Water and Gas Company.
MECHANIC. Kettering Gas-Works.
STOKERS. Ormskirk Gas and Electricity Company.

Agency.—Mechanical Engineers. No. 6335.

Tank Wagons for Hire.—No. 6333.

Plant for Sale.

PURIFIERS, SCRUBBERS, EXHAUSTERS, METER, &c. Leatherhead Gas Company.
TAR EXTRACTORS. Easten's Ltd., London.

Plant, &c., Wanted.

STATION METER. No. 6334.
TANK WAGONS. No. 6330.

Meetings.

BRIGHTON AND HOVE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 7. Two o'clock.
HARROW AND STANMORE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 3. 3.30 o'clock.
NORTH MIDDLESEX GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 3. 2.30 o'clock.
SOUTHGATE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 6. 3.45 o'clock.

TENDERS FOR—

Coke Breeze.
Swindon Gas Company.

General Stores—Shovels, Iron and Steel, Brooms, Cotton Waste, Oil, Lime, Glass, Lamp Irons, Brass Goods, &c.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

Meters.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

Pipes, &c.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

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See illustrated Advertisement Feb. 20, p. III. of Centre.

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